2.6 TRANSPORTATION

The following discussion is based on a traffic analysis completed by *Hexagon Transportation Consultants, Inc.* in September 2006. The purpose of this study was to evaluate the impacts of the proposed land use change and the specific development projects on the transportation system. A complete copy of this report is provided in Appendix F of this EIR. Please refer to Appendix F for additional detail regarding the methodology and results of this analysis.

2.6.1 Setting

2.6.1.1 Existing Transportation Network

A description of the existing transportation system facilities, including the roadway network, transit service, bicycle and pedestrian facilities, is provided below (see Figure 10).

Regional Access

Regional access to the project study area is provided by US 101 and SR 237. These facilities are described below.

US Highway 101 (US 101) is generally a north/south freeway that, in the Bay Area, extends from north of San Francisco to south of San José. In the project vicinity, US 101 is oriented in a northwest/southeast direction and has eight lanes [six mixed-flow lanes, and two High Occupancy Vehicle (HOV) lanes]. US 101 provides access to and from the project site via interchanges at Lawrence Expressway, Fair Oaks Avenue, and Mathilda Avenue.

State Route 237 (SR 237) is a four to six-lane freeway in the vicinity of the project site that extends west to El Camino Real (SR 82) and east to I-880 in Milpitas. East of Mathilda Avenue, SR 237 has two mixed-flow lanes and one HOV lane in each direction. West of Mathilda Avenue, SR 237 has two mixed-flow lanes in each direction. SR 237 provides access to the project study area via interchanges at Lawrence Expressway, Fair Oaks Avenue and Mathilda Avenue.

Local Access

Major roadways within the project area include Lawrence Expressway, Fair Oaks Avenue, Wolfe Road, Tasman Drive, Arques Avenue, Central Expressway and Kifer Road. These roads are described below.

Lawrence Expressway is a north/south roadway providing regional access from SR 237 in the north to Saratoga Avenue in the south. It serves a variety of commercial, industrial, and residential uses. At its terminus to the south, Lawrence Expressway becomes Quito Road. At its terminus to the north, Lawrence Expressway becomes Caribbean Drive. Near the project site, Lawrence Expressway has six mixed flow lanes and two HOV lanes. Lawrence Expressway provides access to the project site via Duane Avenue.

Fair Oaks Avenue is generally a six-lane north-south arterial with two northbound lanes, three southbound lanes, and a two-way center left-turn lane in the study area. North of US 101, Fair Oaks Avenue has a raised center median. Fair Oaks Avenue begins at Java Drive north of SR 237, and extends southward and transitions into Remington Drive at its junction with El Camino Real. Fair Oaks Avenue provides access to the project site via its intersection with Duane Avenue. Freeway interchanges are located at US 101 and SR 237.

Wolfe Road is a north-south arterial that extends from Fair Oaks Avenue in the north to its interchange with I-280 in Cupertino. South of I-280, Wolfe Road transitions into Miller Avenue. Wolfe Road is a six-lane roadway with a raised center median north of Reed Avenue, and is a four-lane undivided roadway south of Reed Avenue. Wolfe Road provides access to the project site via Stewart Drive.

Tasman Drive is an east-west arterial that extends from Morse Avenue eastward to I-880, where it transitions into Great Mall Parkway in Milpitas. West of Fair Oaks Avenue, Tasman Drive is a two-lane commercial collector street. East of Fair Oaks Avenue, Tasman Drive is a four-lane arterial. The LRT line runs down the middle of Tasman Drive between North First Street and Fair Oaks Avenue.

Arques Avenue is a four-lane east-west roadway with a two-way center left-turn lane within the study area. Arques Avenue begins at its intersection with Central Expressway and extends eastward to become Scott Boulevard east of Oakmead Parkway. Scott Boulevard makes a gradual curve south and extends into Santa Clara.

Central Expressway begins in Mountain View as Alma Street, and extends eastward into Santa Clara, where it terminates at De La Cruz Boulevard. Central Expressway is primarily a four-lane east-west oriented expressway within the study area, although it has six lanes between SR 85 and SR 237. East of Bowers Avenue, Central Expressway has four to six lanes. Central Expressway intersects Lawrence Expressway, Fair Oaks Avenue and Wolfe Road near the project site.

Kifer Road is a four-lane east-west roadway with a two-way center left-turn lane within the study area. Kifer Road begins at its intersection with Fair Oaks Avenue and extends eastward to become Walsh Avenue east of Bowers Avenue. Walsh Avenue extends into Santa Clara and terminates just east of Lafayette Street.

Other roadways in the immediate vicinity of the project site include Duane Avenue, Stewart Drive, DeGuigne Drive and Santa Trinita Avenue. These facilities are described below.

Duane Avenue runs east to west and serves as the northern boundary of the project site. Duane Avenue is generally a four-lane undivided roadway between Fair Oaks Avenue and Duane Court. West of Fair Oaks Avenue, Duane Avenue is a two-lane street providing access to the surrounding residential neighborhoods. East of Lawrence Expressway, Duane Avenue becomes Oakmead Parkway. Duane Avenue provides direct access to the project site.

Stewart Drive runs east to west and serves as the southern boundary of the project site. Stewart Drive is a two-lane roadway with a two-way center left-turn lane. Stewart Drive begins at Wolfe Road and extends eastward, makes a curve north and terminates at its intersection with Duane Avenue. Stewart Drive provides direct access to the project site.

DeGuigne Drive is generally a north-south street that runs through the middle of the project site. DeGuigne Drive is a two-lane road with a two-way center left-turn lane between Duane Avenue and Arques Avenue. South of Arques Avenue DeGuigne Drive transitions into Commercial Street. Commercial Street is a two-lane roadway that terminates at Central Expressway.

Santa Trinita Avenue is a short two-lane street with a two-way center left-turn lane. Santa Trinita Avenue connects Stewart Drive with Arques Avenue and serves the surrounding light industrial uses.

2.6.1.2 Existing Pedestrian and Bicycle Facilities

Pedestrian facilities in the project area primarily consist of sidewalks and crosswalks along roadways. There are numerous bike lanes and City-signed bike routes in the vicinity of the project site. The following roadways contain bike lanes:

- Stewart Drive, between Wolfe Road and Duane Avenue
- DeGuigne Drive/Commercial Street, between Duane Avenue and Central Expressway
- Santa Trinita Avenue, between Stewart Drive and Arques Avenue
- Arques Avenue, east of Fair Oaks Avenue
- Fair Oaks Avenue, between Evelyn Avenue and Kifer Road
- Wolfe Road, between Fair Oaks Avenue and Reed Avenue
- Oakmead Parkway, between Lawrence Expressway and Central Expressway
- Lakeside Drive within the City of Sunnyvale limit (terminates at City of Santa Clara boundary)
- Kifer Road, between Fair Oaks Avenue and Lawrence Expressway
- Weddell Drive, serving to connect the John W Christian Greenbelt multi-use off-street paths adjacent to Weddell Drive and Lakehaven Drive
- Morse Avenue, between the John W Christian Greenbelt multi-use off-street path and Persian Drive
- Persian Drive, between Mathilda Avenue and Lawrence Expressway
- Elko Drive, east of Lawrence Expressway
- Tasman Drive, between Morse Avenue and Fair Oaks Avenue
- Moffett Park Drive, between Bordeaux Drive and Sunnyvale Baylands Park
- Crossman Avenue, Between Java Drive and Caribbean Drive
- Caribbean Drive, between US 101 and Mathilda Avenue

Additionally, Fair Oaks Avenue is a signed City bike route between Tasman Drive and Weddell Drive, and a short multi-use off-street path serves as a connection between Britton Avenue and Stewart Drive near the site. Figure 11 shows the existing bicycle facilities in the study area.

Pedestrian facilities in the project area generally consist of sidewalks along most of the local roadways as well as within the surrounding residential neighborhoods. There are no sidewalks, however, along the perimeter of the Taylor Woodrow development project site, along sections of DeGuigne Drive, and along portions of Stewart Drive.

2.6.1.3 Existing Transit Service

Existing transit service to the study area is provided by the Santa Clara Valley Transportation Authority (VTA) and Caltrain. These services are described below.

Bus Service

The project site area is served by several local and express VTA bus lines (shown on Figure 12). Seven bus lines provide service to and from the Lockheed Martin Transit Center, located approximately two miles northwest of the project site. Six bus lines provide service to and from the Sunnyvale Transit Center, located approximately 1.5 miles southwest of the project site. Bus stops located within close proximity (walking distance) of the project site are shown on Figure 12.

Route 26 provides service between the Eastridge Transit Center and the Lockheed Martin Transit Center. Route 26 operates along Fair Oaks Avenue, with 20- to 30-minute headways during commute hours.

Route 54 provides service to West Valley College, the Sunnyvale Transit Center and the Lockheed Martin Transit Center. Within the study area, Route 54 operates along short segments of Mathilda Avenue, Java Drive, Crossman Avenue, Tasman Drive and Morse Avenue, with 30-minute headways during commute hours.

Route 55 provides service between the Great America/Old Ironsides Light Rail Transit (LRT) Station and De Anza College. Within the study area, Route 55 operates along Maude Avenue, Fair Oaks Avenue, Duane Avenue, Lawrence Expressway and Tasman Drive, with 20-minute headways during commute hours. This route provides direct access to the project site via stops along Duane Avenue.

Limited Stop Routes 304 and 305 provide service between the Santa Teresa LRT station and Mountain View. Within the study area, Routes 304 and 305 operate south and west of the project site, with stops along Arques Avenue, Kifer Road, Fair Oaks Avenue, Wolfe Road, California Avenue and Mathilda Avenue, with 30- to 60-minute headways during commute hours.

Limited Stop Route 321 provides service between the Great Mall Transit Center and the Lockheed Martin Transit Center. Within the study area, Route 321 operates along Tasman Drive and segments of Caribbean Drive, Crossman Drive and Java Drive, with 30- to 60-minute headways during commute hours.

Limited Stop Route 328 provides service between the South San Jose-Almaden area and the Lockheed Martin Transit Center. Within the study area, Route 328 operates along Lawrence Expressway and segments of Caribbean Drive, Crossman Drive and Java Drive. Route 328 includes only one bus that operates during the AM and PM commute hours only.

Express Routes 120, 121 and 122 all provide direct service to the Lockheed Martin Transit Center, located approximately 2 miles northwest of the project site. From the Lockheed Martin Transit Center, Express Routes 120, 121 and 122 provide express service to the Fremont BART Station, the Gilroy Transit Center and the Santa Teresa LRT station, respectively.

Express Route 140 provides service between the Fremont BART Station and the Sunnyvale Transit Center. The Sunnyvale Transit Center is located approximately 1.5 miles southwest of the project site.

Light Rail Transit (LRT) Service

The VTA currently operates the 30.5-mile VTA light rail transit (LRT) line system extending from south San Jose through downtown to the northern areas of San Jose, Santa Clara, Mountain View and Sunnyvale. Service operates 24-hours, every 15 minutes during much of the day, and carries over 22,485 riders on an average weekday. The closest LRT stations to the project site are the Fair Oaks, Vienna and Reamwood LRT stations, located approximately 1.5 miles north of the project site. Bus Routes 26 and 54 connect at the Fair Oaks station. T here are no connecting bus routes at the Vienna station. The Reamwood station is served by Routes 55 and 321.

Caltrain

Commuter rail service between San Francisco and Gilroy is provided by Caltrain. The Lawrence Caltrain station is located approximately 1.5 miles south of the project site near the Lawrence Expressway and Kifer Road intersection, with vehicle access provided via Kifer Road. The Sunnyvale Caltrain station is located approximately 1.5 miles southwest of the project site on Evelyn Avenue between Mathilda Avenue and Sunnyvale Avenue. Both Caltrain stations provide Park-and-Ride lots and bike lockers. Caltrain provides seven-day service to both of these stations.

2.6.1.4 Intersection/Level of Service Methodology and Standards

The potential traffic and circulation impacts resulting from the proposed development were evaluated following the standards and methodologies set forth by the City of Sunnyvale and the Santa Clara Valley Transportation Authority (VTA). [The VTA administers the County Congestion Management Program (CMP)]. This evaluation included an analysis of AM and PM peak hour traffic conditions for 33 intersections. The study intersections are identified below.

1. Java Drive and Crossman Avenue
2. Fair Oaks Avenue and Fair Oaks Way
3. Fair Oaks Avenue and Tasman Drive
4. Fair Oaks Avenue and Weddell Drive
5. Fair Oaks Avenue and US 101 NB Ramps
6. Fair Oaks Avenue and Ahwanee Avenue
7. Fair Oaks Avenue and Caliente Drive
8. Fair Oaks Avenue and Duane Avenue
9. Fair Oaks Avenue and Wolfe Road
10. Fair Oaks Avenue and Maude Avenue

11. Fair Oaks Avenue and Arques Avenue
12. Fair Oaks Avenue and California Avenue
13. Fair Oaks Avenue and Kifer Road
14. Wolfe Road and Maude Avenue (unsignalized)
15. Wolfe Road and Stewart Drive
16. Wolfe Road and Arques Avenue
17. Wolfe Road and Central Expressway (North)
18. Wolfe Road and Central Expressway (South)
19. Wolfe Road and Kifer Road
20. DeGuigne Drive and Duane Avenue
21. DeGuigne Drive and Stewart Drive (unsignalized)
22. Commercial Street and Arques Avenue
23. Duane Avenue and Duane Court (unsignalized)
24. Stewart Drive and Duane Avenue
25. Santa Trinita Avenue and Stewart Drive
26. Santa Trinita Avenue and Arques Avenue
27. Lawrence Expressway and Tasman Drive *
28. Lawrence Expressway and Lakehaven Drive
29. Lawrence Expressway and US 101 NB Ramps
30. Lawrence Expressway and US 101 SB Ramps
31. Lawrence Expressway and Oakmead Parkway
32. Lawrence Expressway and Arques Avenue *
33. Lawrence Expressway and Kifer Road

*Designated Congestion Management Program (CMP) intersections.

Traffic conditions at the intersections were analyzed for the weekday AM and PM peak traffic hours. The AM peak hour of traffic is generally between 7:00 and 9:00 AM, and the PM peak hour is typically between 4:00 and 6:00 PM. It is during these periods that the most congested traffic conditions occur on an average weekday.

Traffic conditions at the above intersections were evaluated for the following scenarios:

Existing Conditions: Existing traffic volumes obtained from traffic data and counts.

Background Conditions: Existing volumes plus traffic from approved by not yet constructed developments in the area.

Near-Term Project Conditions Background traffic volumes plus traffic from the two proposed near-term residential projects.[6]

Future 2020 Baseline Conditions: Future 2020 forecast traffic volumes obtained from the City of Sunnyvale transportation model.

Long-Range GPA Conditions: Future 2020 volumes with full build-out of the proposed ITR designation on the overall project site.

[6] One of the projects, the Taylor-Woodrow 304-unit residential development, would replace 111,300 square feet of light industrial uses currently on the site. Therefore, the trips generated by the existing light industrial uses were first subtracted from background traffic volumes at each study intersection before adding the traffic generated by the project.

Impacts of the project on freeway segments near the project site and on transit, bicycle and pedestrian facilities and services were also evaluated and are discussed later in this section.

Intersection Level of Service Analysis

In Sunnyvale, the description of traffic congestion is based on the "level of service" concept developed by the National Academy of Sciences and described in the *Highway Capacity Manual*. The existing and near-term operations of the intersections in the site area were evaluated using Level of Service (LOS) calculations. Level of Service is a qualitative description of a roadway's operation, ranging from LOS A, or free-flow conditions, to LOS F, or over-saturated conditions (see Table 9).

TABLE 9:
SIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS

Level of Service	Description of Operations	Average Control Delay* (seconds / vehicle)
A	Insignificant Delays: No approach phase is fully utilized and no vehicle waits longer than one red indication.	≤ 10.0
B	Minimal Delays: An occasional approach phase is fully utilized. Drivers begin to feel restricted.	> 10.1 to 20.0
C	Acceptable Delays: Major approach phase may become fully utilized. Most drivers feel somewhat restricted.	> 20.1 to 35.0
D	Tolerable Delays: Drivers may wait through no more than one red indication. Queues may develop but dissipate rapidly, without excessive delays.	> 35.1 to 55.0
E	Significant Delays: Volumes approaching capacity. Vehicles may wait through several signal cycles and long vehicle queues from upstream.	> 55.1 to 80.0
F	Excessive Delays: Represents conditions at capacity, with extremely long delays. Queues may block upstream intersections.	> 80.0

Source: *Highway Capacity Manual*, Transportation Research Board, 2000.
* Average Control Delay includes the time for initial deceleration delay, queue move-up time, stopped delay, and final acceleration.

Traffic operations at the study intersection were evaluated using TRAFFIX software to determine the Level of Service (LOS) for the AM and PM peak hours. TRAFFIX evaluates signalized intersection operation on the basis of *average control delay*[7] for all vehicles at the intersection. The analysis uses procedures from the 2000 *Highway Capacity Manual* (HCM) method for signalized intersections. TRAFFIX is also the Congestion Management Program (CMP) designated intersection LOS software analysis program. Acceptable LOS for City of Sunnyvale intersections is LOS D, and for regional CMP facilities, the acceptable level of service is LOS E.

Freeway Segment Analysis

According to CMP guidelines, a detailed freeway segment analysis is required when a proposed development would add traffic to a freeway segment operating at LOS F equal to one percent (1%) or greater of the segment's capacity. The results of the freeway evaluation conducted for this project show that the near-term development projects would not cause a significant increase in traffic volume (one percent or more of capacity) on any of the freeway segments in the study area. The long-term buildout under the proposed ITR General Plan designation would cause an increase of more than one percent on the segment of US 101 between Great America Parkway and Lawrence Expressway. However, this would not be considered a significant impact, since this segment of US 101 currently operates at LOS D during both the AM and PM peak hours. Therefore, based on the results of the freeway segment capacity evaluation, a more detailed analysis of freeway segments is not required (refer to Appendix F).

2.6.1.5 Existing Intersection Levels of Service

The results of the intersection LOS analysis under existing conditions are summarized in Table 10. All of the signalized study intersections currently operate at acceptable levels of service during both the AM and PM peak hours of traffic.

[7] Average control delay includes the time for initial deceleration delay, queue move-up time, stopped delay, and final acceleration.

TABLE 10: EXISTING INTERSECTION LEVELS OF SERVICE			
Intersection	**Peak Hour**	**Average Delay[1]**	**LOS[2]**
Java Dr. & Crossman Ave.	AM	18.2	B
	PM	27.0	C
Fair Oaks Ave. & Fair Oaks Way	AM	18.7	B
	PM	20.1	C
Fair Oaks Ave. & Tasman Dr	AM	23.1	C
	PM	28.0	C
Fair Oaks Ave. & Weddell Dr.	AM	13.3	B
	PM	22.1	C
Fair Oaks Ave. & US 101 NB Ramps	AM	22.5	C
	PM	26.0	C
Fair Oaks Ave. & Ahwanee Ave.	AM	16.8	B
	PM	15.4	B
Fair Oaks Ave. & Caliente Dr.	AM	11.4	B
	PM	7.9	A
Fair Oaks Ave. & Duane Ave.	AM	28.5	C
	PM	23.9	C
Fair Oaks Ave. & Wolfe Rd.	AM	20.7	C
	PM	17.9	B
Fair Oaks Ave. & Maude Ave.	AM	24.0	C
	PM	22.7	C
Fair Oaks Ave. & Arques Ave.	AM	22.6	C
	PM	31.9	C
Fair Oaks Ave. & California Ave.	AM	12.8	B
	PM	12.1	B
Fair Oaks Ave. & Kifer Rd.	AM	8.4	A
	PM	16.2	B
Wolfe Rd. & Stewart Dr.	AM	8.5	A
	PM	10.2	B
Wolfe Rd. & Arques Ave.	AM	18.7	B
	PM	21.2	C
Wolfe Rd. & Central Expwy (N)	AM	11.4	B
	PM	16.2	B
Wolfe Rd. & Central Expwy (S)	AM	8.6	A
	PM	16.2	B
Wolfe Rd. & Kifer Rd.	AM	20.8	C
	PM	31.1	C
DeGuigne Dr. & Duane Ave.	AM	3.8	A
	PM	8.0	A
Commercial St. & Arques Ave.	AM	13.5	B
	PM	20.2	C
Stewart Dr. & Duane Ave.	AM	47.7	D
	PM	39.0	D

TABLE 10 (CONTINUED): EXISTING INTERSECTION LEVELS OF SERVICE			
Intersection	**Peak Hour**	**Average Delay[1]**	**LOS[2]**
Santa Trinita Ave. & Stewart Dr.	AM	17.5	B
	PM	18.7	B
Santa Trinita Ave. & Arques Ave.	AM	9.8	A
	PM	16.6	B
Lawrence Expwy. & Tasman Dr. *	AM	46.6	D
	PM	51.9	D
Lawrence Expwy. & Lakehaven Dr.	AM	61.6	E
	PM	60.7	E
Lawrence Expwy. & US 101 NB Ramps	AM	15.7	B
	PM	17.5	B
Lawrence Expwy. & US 101 SB Ramps	AM	10.3	B
	PM	15.2	B
Lawrence Expwy. & Oakmead Pkwy.	AM	41.4	D
	PM	49.1	D
Lawrence Expwy. & Arques Ave. *	AM	38.0	D
	PM	66.3	E
Lawrence Expwy. & Kifer Rd.	AM	23.0	C
	PM	50.4	D

Notes:
[1] Average control delay per vehicle in seconds.
[2] LOS = Level of Service.
* Denotes CMP Intersection.

2.6.1.6 Background Conditions

The following discussion describes background conditions in the project area. Background conditions are defined as conditions just prior to completion of the proposed project. Traffic volumes for background conditions include volumes from existing traffic counts plus traffic generated by other approved, but not yet constructed or occupied, developments.

Planned Roadway Improvements

The transportation network under near-term background conditions would be the same as the existing transportation network.

Background Intersection Level of Service

The results of the intersection LOS analysis under background conditions are summarized in Table 11. All of the signalized study intersections would continue to operate at acceptable levels of service during both the AM and PM peak hours of traffic under near-term background conditions.

TABLE 11:
BACKGROUND CONDITIONS INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Existing		Background	
		Average Delay[1]	LOS[2]	Average Delay[1]	LOS[2]
Java Dr. & Crossman Ave.	AM	18.2	B	18.2	B
	PM	27.0	C	27.0	C
Fair Oaks Ave. & Fair Oaks Way	AM	18.7	B	21.5	C
	PM	20.1	C	19.8	B
Fair Oaks Ave. & Tasman Dr	AM	23.1	C	19.3	B
	PM	28.0	C	26.4	C
Fair Oaks Ave. & Weddell Dr.	AM	13.3	B	13.2	B
	PM	22.1	C	21.8	C
Fair Oaks Ave. & US 101 NB Ramps	AM	22.5	C	24.3	C
	PM	26.0	C	29.8	C
Fair Oaks Ave. & Ahwanee Ave.	AM	16.8	B	16.4	B
	PM	15.4	B	15.1	B
Fair Oaks Ave. & Caliente Dr.	AM	11.4	B	10.9	B
	PM	7.9	A	7.8	A
Fair Oaks Ave. & Duane Ave.	AM	28.5	C	28.4	C
	PM	23.9	C	24.1	C
Fair Oaks Ave. & Wolfe Rd.	AM	20.7	C	21.0	C
	PM	17.9	B	18.3	B
Fair Oaks Ave. & Maude Ave.	AM	24.0	C	23.7	C
	PM	22.7	C	22.8	C
Fair Oaks Ave. & Arques Ave.	AM	22.6	C	24.4	C
	PM	31.9	C	32.5	C
Fair Oaks Ave. & California Ave.	AM	12.8	B	12.5	B
	PM	12.1	B	11.4	B
Fair Oaks Ave. & Kifer Rd.	AM	8.4	A	8.4	A
	PM	16.2	B	16.5	B
Wolfe Rd. & Stewart Dr.	AM	8.5	A	10.2	B
	PM	10.2	B	12.2	B
Wolfe Rd. & Arques Ave.	AM	18.7	B	19.7	B
	PM	21.2	C	22.4	C
Wolfe Rd. & Central Expwy (N)	AM	11.4	B	12.2	B
	PM	16.2	B	16.0	B
Wolfe Rd. & Central Expwy (S)	AM	8.6	A	9.0	A
	PM	16.2	B	16.2	B
Wolfe Rd. & Kifer Rd.	AM	20.8	C	21.5	C
	PM	31.1	C	31.3	C
DeGuigne Dr. & Duane Ave.	AM	3.8	A	4.3	A
	PM	8.0	A	7.8	A
Commercial St. & Arques Ave.	AM	13.5	B	13.2	B
	PM	20.2	C	20.0	C
Stewart Dr. & Duane Ave.	AM	47.7	D	47.7	D
	PM	39.0	D	39.0	D

TABLE 11 (CONTINUED): BACKGROUND CONDITIONS INTERSECTION LEVELS OF SERVICE					
		Existing		Background	
Intersection	Peak Hour	Average Delay[1]	LOS[2]	Average Delay[1]	LOS[2]
Santa Trinita Ave. & Stewart Dr.	AM	17.5	B	17.5	B
	PM	18.7	B	18.7	B
Santa Trinita Ave. & Arques Ave.	AM	9.8	A	9.9	A
	PM	16.6	B	16.3	B
Lawrence Expwy. & Tasman Dr. *	AM	46.6	D	45.9	D
	PM	51.9	D	52.8	D
Lawrence Expwy. & Lakehaven Dr.	AM	61.6	E	61.1	E
	PM	60.7	E	59.3	E
Lawrence Expwy. & US 101 NB Ramps	AM	15.7	B	16.7	B
	PM	17.5	B	18.0	B
Lawrence Expwy. & US 101 SB Ramps	AM	10.3	B	11.3	B
	PM	15.2	B	15.8	B
Lawrence Expwy. & Oakmead Pkwy.	AM	41.4	D	40.6	D
	PM	49.1	D	49.3	D
Lawrence Expwy. & Arques Ave. *	AM	38.0	D	41.1	D
	PM	66.3	E	72.0	E
Lawrence Expwy. & Kifer Rd.	AM	23.0	C	27.3	C
	PM	50.4	D	56.2	E

Notes:
[1] Average control delay per vehicle in seconds.
[2] LOS = Level of Service.
* Denotes CMP Intersection.

2.6.2 Transportation Impacts

2.6.2.1 Thresholds of Significance

For the purposes of this project, a transportation impact is considered significant if the project would:

- Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections);
- Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency or the City of Sunnyvale for designated roads or highways;
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in locations that results in substantial safety risks;
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., from equipment);

- Result in inadequate emergency access;
- Result in inadequate parking capacity; or
- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).

2.6.2.2 Impacts from the General Plan Amendment

It is always the case for a General Plan land use amendment that the timing of future development is unknown and, therefore, it is not possible to forecast what the conditions would be at nearby intersections when a specific project develops. Even when development is proposed concurrently (as in this case for two portions of the overall site), there is no guarantee that the currently proposed development projects will be built immediately – or ever. The General Plan land use designation may be in place for many years before specific redevelopment takes place, and the analysis needs to reflect the long-term planning horizon. The analytic process for a GPA, therefore, uses different tools than the LOS near-term analysis which is prepared for specific development proposals. The mitigation for long-term congestion impacts that might be forecast as resulting from land use changes is conformance with existing General Plan policies.

As described in Section *1. Description of the Project*, the project proposes to amend the City's General Plan Land Use Map to change the land use and zoning designation on the site from *M-S (Industrial and Service)* to *Industrial-to-Residential (ITR)* in order to allow for the conversion and redevelopment of the site with residential uses. Development of the residential uses on the site in accordance with the City's *R-3 (Medium-Density Residential)* and *R-4 (High-Density Residential)* zoning districts (refer to Figure 4) would result in a loss of 671 industrial jobs[8] on the overall site and an increase of 2,842 additional households. The potential traffic and circulation impacts of the proposed GPA were evaluated and compared to the year 2020 baseline traffic volumes and conditions which were developed using the City's long-term transportation model.

General Plan Amendment Trip Generation

The amount of traffic added to the roadway system by the project was estimated by multiplying the applicable trip generation rates by the size of the proposed developments. The trip generation rates used for the proposed project are based on those published in the Institute of Transportation Engineers (ITE) manual, *Trip Generation,* Seventh Edition. Since the proposed GPA scenario involves converting light industrial land to residential uses, the traffic trips currently being generated by the light industrial uses were first estimated and then subtracted at each intersection before the estimated residential trips from the proposed GPA scenario were added to the roadway network. The trip generation estimates are presented below in Table 12 for the proposed long-term GPA land use scenario.

[8] Gerri Caruso. Principal Planner. Community Development Department. City of Sunnyvale. Written Communications. 2006.

TABLE 12:
PROPOSED LONG-TERM GENERAL PLAN SCENARIO –
TRIP GENERATION ESTIMATES

			Trip Generation Estimates						
				AM Peak Hour			PM Peak Hour		
Land Use	**Size**	**Daily Rate[1]**	**Daily Trips**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Existing Use									
Research & Development/Office (129.23 acres @ 0.35 FAR)	1,970.24 ksf[2]	8.11	-15,979	-2028	-415	-2443	-319	-1809	-2128
Proposed GPA Land Uses									
Condos/Townhouses (2,842 units)	2,842 units	5.86	16,654	213	1,038	1,251	990	488	1,478
Retail (9.57 acres @ 0.25 FAR)	104.22 ksf	42.94	4,475	66	42	108	188	203	391
Total Net Trip Generation:			**5,150**	**-1,749**	**665**	**-1,084**	**859**	**-1,118**	**-259**

[1] Source: ITE *Trip Generation Manual*, Seventh Edition, 2003. (Average rates were used.)
[2] ksf = thousand square feet

The GPA Scenario 1 would generate 21,129 gross daily vehicle trips, with 1,359 gross trips occurring during the AM peak hour and 1,869 gross trips occurring during the PM peak hour. After subtracting out the traffic being generated by the existing light industrial uses to be replaced, GPA Scenario 1 would generate 5,150 net new daily trips, with 1,084 fewer trips occurring during the AM peak hour and 259 fewer trips occurring during the PM peak hour. Using the ITE specified inbound/outbound splits, the GPA Scenario 1 would produce 1,749 fewer inbound and 665 new outbound trips during the AM peak hour, and 859 new inbound and 1,118 fewer outbound trips during the PM peak hour.

The trip distribution patterns for the proposed GPA was estimated based on existing travel patterns in the area, the locations of complementary land uses, and the City of Sunnyvale's 2020 transportation model. The peak hour trips generated by the existing light industrial uses were subtracted from each of the study intersections based on this distribution pattern before the estimated GPA scenario trips were added. The peak hour trips generated by the long-conversion of the site to residential uses were then assigned to the roadway network.

Planned Roadway and Transportation Network Improvements

The transportation network under future 2020 conditions, including roadways and intersection lane configurations, would be the same as that described previously under *Background Conditions* with the following exceptions:

- Fair Oaks Avenue and Arques Avenue (funded improvement) – An exclusive southbound right-turn lane will be added per the City's Transportation Strategic Program.
- Lawrence Expressway –and Arques Avenue (funded improvement) – Lawrence Expressway and Arques Avenue will be grade-separated per the City's Transportation Strategic Program.

It should be noted that for the purpose of this study, the traffic operations at the Lawrence Expressway and Arques Avenue intersection under future 2020 conditions were analyzed based on the existing lane configuration. The future intersection configuration with the grade separation is unknown at this time and will require a detailed design study.

Future 2020 Traffic Volumes

An intersection level of service analysis was conducted to determine if the proposed GPA scenario would result in significant long-term traffic impacts. For the long-range GPA level of service analysis, the criteria used to determine impacts on intersections were based on the City of Sunnyvale Level of Service and County Congestion Management Program (CMP) standards as described previously. The traffic conditions under the proposed long-range GPA scenario were evaluated relative to 2020 baseline conditions in order to determine potential long-range traffic impacts.

Long-Range GPA Intersection Levels of Service

The results of the signalized intersection LOS analysis under the long-range GPA scenario are summarized in Table 13. The LOS calculation sheets are included in Appendix F. (Note that the levels of service at some of the study intersections improve under the future GPA scenario when compared to 2020 baseline conditions. This is because the future GPA scenario involves replacing light industrial uses with residential uses. As a result, the overall site would experience fewer inbound trips in the AM peak hour and fewer outbound trips in the PM peak hour. The shift in travel patterns would result in lower approach volumes for the primary movements at some of the study intersections, which correspondingly improves the level of service.)

According to CMP standards, both CMP study intersections would operate at acceptable levels of service (LOS E or better) during the AM and PM peak hours under the proposed long-range GPA scenario.

Measured against City of Sunnyvale standards, the following signalized study intersections would be significantly impacted during the PM peak hour by future build-out of the site under the proposed GPA scenario as indicated below:

- Fair Oaks Avenue and Arques Avenue
- Stewart Drive and Duane Avenue

TABLE 13:
LONG-RANGE GPA INTERSECTION LEVEL OF SERVICE SUMMARY

		2020 Baseline		GPA Scenario 1			
Intersection	**Peak Hour**	**Ave. Delay**	**LOS**	**Ave. Delay**	**LOS**	**Incr. In Crit. Delay**	**Incr. In Crit. V/C**
Java Dr. & Crossman Ave.	AM	18.4	B	18.2	B	0.0	0.007
	PM	55.3	E	57.2	E	2.1	0.011
Fair Oaks Ave. & Fair Oaks Way	AM	29.9	C	30.6	C	0.7	0.010
	PM	21.7	C	22.3	C	0.5	0.008
Fair Oaks Ave. & Tasman Dr.	AM	29.9	C	30.0	C	0.2	0.010
	PM	40.7	D	41.7	D	1.4	0.010
Fair Oaks Ave. & Weddell Dr.	AM	13.2	B	12.2	B	-1.3	-0.017
	PM	18.8	B	17.9	B	-1.5	-0.013
Fair Oaks Ave. & US 101 NB Ramps	AM	26.9	C	26.8	C	0.3	0.015
	PM	63.8	E	62.1	E	-3.1	-0.006
Fair Oaks Ave. & Ahwanee Ave.	AM	18.4	B	19.0	B	0.6	0.026
	PM	14.2	B	14.2	B	0.0	0.020
Fair Oaks Ave. & Caliente Ave.	AM	10.3	B	10.8	B	0.5	0.026
	PM	8.6	A	8.8	A	0.4	0.020
Fair Oaks Ave. & Duane Ave.	AM	36.2	D	30.2	C	-10.0	-0.090
	PM	25.9	C	26.7	C	11.7	0.109
Fair Oaks Ave. & Wolfe Rd.	AM	23.8	C	23.1	C	0.0	-0.005
	PM	29.4	C	30.3	C	1.0	0.004
Fair Oaks Ave, & Muade Ave.	AM	31.6	C	32.2	C	5.3	0.051
	PM	46.3	D	48.3	D	3.6	0.010
Fair Oaks Ave. & Arques Ave.	AM	31.5	C	31.6	C	8.4	0.042
With Mitigation				*30.7*	*C*		
	PM	56.5	E	**60.9**	**E**	**4.6**	**0.024**
With Mitigation				*49.9*	*D*		
Fair Oaks Ave. & California Ave.	AM	11.6	B	11.6	B	-0.1	-0.022
	PM	11.7	B	12.1	B	0.7	0.000
Fair Oaks Ave. & Kifer Rd.	AM	20.3	C	20.9	C	1.3	-0.009
	PM	25.2	C	24.6	C	-0.6	0.001
Wolfe Rd. & Stewart Dr.	AM	8.4	A	11.3	B	3.3	0.059
	PM	9.4	A	9.6	A	-0.7	-0.045
Wolfe Rd. & Arques Ave.	AM	33.4	C	25.1	C	-14.4	-0.074
	PM	33.5	C	30.3	C	-4.7	-0.008
Wolfe Rd. & Central Expressway (N)	AM	16.0	B	16.8	B	0.3	0.013
	PM	15.4	B	15.1	B	0.1	-0.023
Wolfe Rd. & Central Expressway (S)	AM	19.6	B	19.7	B	0.0	0.001
	PM	15.3	B	15.6	B	-0.3	-0.032
Wolfe Rd. & Kifer Rd.	AM	210.1	F	183.9	F	-30.5	-0.036
	PM	84.8	F	76.8	E	-11.9	-0.031
De Guigne Dr. & Duane Ave.	AM	7.2	A	9.2	A	1.5	-0.013
	PM	6.1	A	3.9	A	-2.1	-0.004

TABLE 13:
LONG-RANGE GPA INTERSECTION LEVEL OF SERVICE SUMMARY

		2020 Baseline		GPA Scenario 1			
Intersection	**Peak Hour**	**Ave. Delay**	**LOS**	**Ave. Delay**	**LOS**	**Incr. In Crit. Delay**	**Incr. In Crit. V/C**
	PM	22.0	C	22.9	C	0.4	0.022
Stewart Dr. & Duane Ave.	AM	67.3	E	20.5	C	-81.3	-0.287
With Mitigation				*21.9*	*C*		
	PM	186.0	F	**203.6**	**F**	**33.0**	**0.059**
With Mitigation				*41.3*	*D*		
Santa Trinita Ave. & Stewart Dr.	AM	18.4	B	18.6	B	1.2	0.003
	PM	22.4	C	20.8	C	-2.3	-0.128
Santa Trinita Ave. & Arques Ave.	AM	10.5	B	10.7	B	-0.1	-0.024
	PM	14.5	B	9.9	A	-6.3	-0.133
Lawrence Expwy. & Tasman Dr.*	AM	48.9	D	48.8	D	-1.2	-0.033
	PM	63.6	E	64.3	E	-0.9	0.004
Lawrence Expwy. & Lakehaven Dr.	AM	50.1	D	48.2	D	-2.2	-0.006
	PM	59.7	E	62.0	E	1.4	0.012
Lawrence Expwy. & US 101 NB Ramps	AM	18.3	B	17.4	B	-0.2	-0.002
	PM	22.1	C	23.7	C	2.1	0.036
Lawrence Expwy. & US 101 SB Ramps	AM	13.1	B	12.4	B	-0.4	0.008
	PM	37.7	D	46.3	D	12.7	0.035
Lawrence Expwy. &Oakmead Pkwy.	AM	45.3	D	51.4	D	7.5	0.053
	PM	93.0	F	67.6	E	-43.5	-0.100
Lwrence Expwy. & Arques Ave.*	AM	41.3	D	37.9	D	-7.1	-0.057
	PM	97.6	F	70.1	E	-44.7	-0.149
Lawrence Expwy. & Kifer Rd.	AM	40.5	D	40.3	D	-0.2	-0.044
	PM	68.9	E	65.4	E	-5.1	-0.029

Notes:

*Denotes a CMP intersection

Significant impacts are shown with an outline

Fair Oaks Avenue and Arques Avenue

The level of service at this intersection would be LOS E under 2020 baseline conditions during the PM peak hour, and the added trips as a result of the proposed GPA Scenario would cause the average critical delay to increase by more than four (4) seconds and increase the V/C ratio by more than 0.01. Based on City of Sunnyvale of service impact criteria, this constitutes a significant impact.

Stewart Drive and Duane Avenue

The level of service at this intersection would be LOS F under 2020 baseline conditions during the PM peak hour, and the added trips as a result of the proposed GPA Scenario or would cause the average critical delay to increase by more than four (4) seconds and increase the V/C ratio by more than 0.01. Based on City of Sunnyvale of service impact criteria, this constitutes a significant impact.

IMPACT TRANS-1: Future build-out of the site under the proposed GPA scenario would result in significant impacts to two City of Sunnyvale intersections: Fair Oaks Avenue/Arques Avenue and Stewart Drive/Duane Avenue. (Significant Impact)

2.6.2.3 Impacts from the Two Specific Near-Term Development Projects

The magnitude of traffic produced by new developments and the locations where that traffic would appear are estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. In determining project trip generation, the magnitude of traffic entering and exiting the sites is estimated for the AM and PM peak hours. As part of the project trip distribution, an estimate is made of the directions to and from which the project trips would travel. In the project trip assignment, the project trips are assigned to specific streets and intersections. These procedures are described further in the following sections.

Planned Roadway Improvements and Roadway Network

The City of Sunnyvale has stipulated that the following roadway improvement will be implemented by the applicants under near-term project conditions:

- Duane Avenue and DeGuigne Drive – Improvements consist of reconfiguring this intersection, including the removal of the pork-chop island on the west approach. Removal of the "pork chop" island would result in loss of the separate eastbound right-turn lane.

Near-Term Projects Trip Generation

The amount of traffic added to the roadway system by the project was estimated by multiplying the applicable trip generation rates by the size of the proposed developments. The trip generation rates used for the proposed project are based on those published in the Institute of Transportation Engineers (ITE) manual, *Trip Generation,* Seventh Edition.

The 250-unit townhouse development would be constructed on the currently vacant 14-acre AMD site located in the southeast quadrant of the Duane Avenue and DeGuigne Drive intersection. The 304-unit Taylor-Woodrow condominium/townhouse development would replace the existing light industrial uses currently on the 7.3-acre site located in the northeast quadrant of the Duane Avenue and Stewart Drive intersection. Therefore, the trips generated by the existing light industrial uses were estimated and subtracted at each intersection before project trips were added to the roadway network.

The two proposed residential developments would generate approximately 3,064 gross daily vehicle trips, with 230 gross trips occurring during the AM peak hour and 272 gross trips occurring during the PM peak hour. After subtracting out the traffic being generated by the existing light industrial uses to be replaced, the projects would generate approximately 2,161 net daily trips, with 92 new trips occurring during the AM peak hour and 151 new trips occurring during the PM peak hour. Using the ITE specified inbound/outbound splits, the residential projects would produce approximately 76 fewer inbound and 168 new outbound trips during the AM peak hour, and approximately 164 new inbound and 13 fewer outbound trips during the PM peak hour. The project trip generation estimates are presented below in Table 14.

TABLE 14:
NEAR-TERM DEVELOPMENT PROJECTS TRIP GENERATION ESTIMATES

			Trip Generation Estimates						
				AM Peak Hour			PM Peak Hour		
Land Use	**Size**	**Daily Rate[1]**	**Daily Trips**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Existing Use									
Research & Development/Office (7.3 acres @0.35 FAR)	111.29 ksf[2]	8.11	903	115	23	138	18	103	121
Proposed Uses									
Condos/Townhouses (Taylor Woodrow Site)	304 units	5.86	1,781	23	111	134	106	52	158
Condos/Townhouses (AMD Site)	250 units	5.86	1,465	19	91	110	87	43	130
Total Net Trip Generation:			**2,343**	**-73**	**179**	**106**	**175**	**-8**	**167**

[1] Source: ITE *Trip Generation Manual*, Seventh Edition, 2003. (Average rates were used.)
[2] ksf = thousand square feet

Near-Term Project Trip Distribution and Assignment

The trip distribution patterns for the proposed projects was estimated based on existing travel patterns in the area, the locations of complementary land uses, and the City of Sunnyvale's 2020 transportation model. The peak hour trips generated by the existing light industrial uses were subtracted from each of the study intersections based on this distribution pattern before the estimated near-term project trips were added. The peak hour trips generated by the near-term residential projects were then assigned to the roadway network The project trip distribution and assignment for the existing industrial and residential project trips are shown graphically on Figures 13 and 14.

LOS Traffic Impacts from the Two Near-Term Development Projects

Project conditions are defined as background traffic volumes plus the addition of project traffic. The levels of service for project conditions are summarized in Table 15 below: All of the signalized study intersections would continue to operate at acceptable levels of service during both the AM and PM peak hours of traffic under near-term project conditions. Therefore, the two specific development projects would not result in significant near-term traffic impacts and no mitigation is required in the near-term for these two projects (see *2.6.4 Mitigation and Avoidance Measures* discussion below).

IMPACT TRANS-2: All of the signalized study intersections would continue to operate at acceptable levels of service during both the AM and PM peak hours of traffic under near-term project conditions. For this reason, the two proposed near-term development projects would not result in significant near-term traffic impacts. (Less Than Significant Impact)

Pedestrian, Bicycle and Transit Impacts

Pedestrian traffic primarily would be generated by residents walking to and from local schools, parks, transit stops, and nearby retail centers. Most of the roadways in the project area currently have sidewalks on both sides of the street, with crosswalks at all of the signalized intersections. The extensive network of sidewalks within the study area would provide residents with a safe connection between the project sites and the other surrounding land uses in the area.

Many of the roadways near the near-term project sites and in the GPA area contain bike lanes. The street widths and low traffic volumes on the local streets are conducive to bicycle travel. Additionally, the City plans to add bike lanes to Duane Avenue in conjunction with the planned improvements. Because the study area contains a fairly extensive bicycle network, a reasonable and conservative assumption for bicycle commute trip generation would be a one percent mode share. For the near-term projects, this calculates to about one new peak hour bicycle trip in the AM and about two bicycle trips in the PM peak period of traffic. Thus, the near-term residential projects would have very little impact on the capacity of existing bicycle facilities in the study area.

TABLE 15:
NEAR-TERM DEVELOPMENT PROJECTS INTERSECTION LEVELS OF SERVICE

		Background Conditions		Near-Term Project Cond.			
Intersection	**Peak Hour**	**Average Delay[1]**	**LOS[2]**	**Average Delay[1]**	**LOS[2]**	**Incr. Critical Delay**	**Incr. Crit. V/C**
Java Dr. & Crossman Ave.	AM	18.2	B	18.2	B	-0.1	0.000
	PM	27.0	C	27.0	C	0.0	0.002
Fair Oaks Ave. & Fair Oaks Way	AM	18.7	B	21.5	C	0.0	0.002
	PM	21.2	C	19.8	B	0.0	0.002
Fair Oaks Ave. & Tasman Dr	AM	23.7	C	19.3	B	0.0	0.002
	PM	28.7	C	26.5	C	0.0	0.002
Fair Oaks Ave. & Weddell Dr.	AM	14.1	B	13.2	B	-0.1	0.001
	PM	22.7	C	21.8	C	-0.1	0.001
Fair Oaks Ave. & US 101 NB Ramps	AM	22.9	C	24.4	C	0.2	0.006
	PM	26.0	C	30.1	C	0.4	0.004
Fair Oaks Ave. & Ahwanee Ave.	AM	16.6	B	16.3	B	-0.1	0.005
	PM	15.2	B	15.1	B	0.0	0.004
Fair Oaks Ave. & Caliente Dr.	AM	11.2	B	10.9	B	0.0	0.006
	PM	7.8	A	7.7	A	0.0	0.004
Fair Oaks Ave. & Duane Ave.	AM	28.2	C	28.5	C	0.0	-0.001
	PM	23.8	C	24.4	C	0.9	0.015
Fair Oaks Ave. & Wolfe Rd.	AM	20.9	C	21.0	C	0.1	0.002
	PM	18.4	B	18.4	B	0.1	0.003
Fair Oaks Ave. & Maude Ave.	AM	23.8	C	23.7	C	0.0	-0.001
	PM	22.5	C	23.0	C	0.2	0.002
Fair Oaks Ave. & Arques Ave.	AM	23.5	C	25.9	C	5.3	0.048
	PM	32.3	C	33.3	C	1.2	0.018
Fair Oaks Ave. & California Ave.	AM	12.7	B	12.5	B	0.0	-0.001
	PM	11.7	B	11.6	B	0.3	0.003
Fair Oaks Ave. & Kifer Rd.	AM	8.5	A	8.6	A	0.3	0.003
	PM	16.7	B	16.5	B	0.1	0.001
Wolfe Rd. & Stewart Dr.	AM	8.6	A	11.5	B	1.5	0.012
	PM	10.2	B	12.3	B	0.0	0.000
Wolfe Rd. & Arques Ave.	AM	19.2	B	20.0	B	0.1	0.000
	PM	21.5	C	22.5	C	0.1	0.005
Wolfe Rd. & Central Expy (N)	AM	11.8	B	12.4	B	0.2	0.003
	PM	16.2	B	15.9	B	0.0	0.000

TABLE 15 (CONTINUED):
NEAR-TERM DEVELOPMENT PROJECTS INTERSECTION LEVELS OF SERVICE

		Background Conditions		Near-Term Project Cond.			
Intersection	**Peak Hour**	**Average Delay[1]**	**LOS[2]**	**Average Delay[1]**	**LOS[2]**	**Incr. Critical Delay**	**Incr. Crit. V/C**
Wolfe Rd. & Central Expy (S)	AM	8.7	A	9.0	A	0.0	0.000
	PM	16.2	B	16.2	B	0.0	0.000
Wolfe Rd. & Kifer Rd.	AM	21.5	C	21.5	C	0.0	-0.001
	PM	31.6	C	31.5	C	0.5	0.005
DeGuigne Dr. & Duane Ave.	AM	4.1	A	5.1	A	0.3	0.011
	PM	6.6	A	8.1	A	0.3	0.010
Commercial St. & Arques Ave.	AM	13.2	B	14.0	B	1.0	0.017
	PM	20.1	C	20.6	C	1.2	0.018
Stewart Dr. & Duane Ave.	AM	47.7	D	37.4	D	-15.7	0.015
	PM	39.0	D	51.0	D	14.8	0.068
Santa Trinita Ave. & Stewart Dr.	AM	17.5	B	17.4	B	0.0	0.012
	PM	18.7	B	18.6	B	-0.2	0.016
Santa Trinita Ave. & Arques Ave.	AM	9.9	A	9.9	A	-0.2	-0.005
	PM	16.6	B	16.2	B	-0.3	-0.005
Lawrence Expwy. & Tasman Dr. *	AM	47.3	D	45.9	D	0.0	-0.001
	PM	54.2	D	52.9	D	0.2	0.004
Lawrence Expwy. & Lakehaven Dr.	AM	61.3	E	61.0	E	0.0	-0.001
	PM	59.9	E	59.3	E	0.0	0.002
Lawrence Expwy. & US 101 NB Ramps	AM	16.8	B	16.6	B	-0.1	0.000
	PM	18.1	B	18.2	B	0.2	0.008
Lawrence Expwy. & US 101 SB Ramps	AM	11.4	B	11.3	B	0.0	0.004
	PM	15.9	B	15.8	B	0.1	0.008
Lawrence Expwy. & Oakmead Pkwy.	AM	40.6	D	42.2	D	2.4	0.017
	PM	49.3	D	49.3	D	0.6	0.005
Lawrence Expwy. & Arques Ave. *	AM	40.4	D	41.0	D	-0.5	0.000
	PM	71.9	E	71.5	E	-0.7	-0.004
Lawrence Expwy. & Kifer Rd.	AM	27.3	C	27.3	C	0.0	-0.002
	PM	56.2	E	56.1	E	-0.1	-0.001

Notes:
[1] Average control delay per vehicle in seconds.
[2] LOS = Level of Service.
* Denotes CMP Intersection.

Assuming up to three percent transit mode share for the two near-term project sites equates to approximately three (3) new transit riders during the AM peak commute period and five (5) new transit riders during the PM peak period. These new riders easily could be accommodated by the available ridership capacity of the nearby bus lines. Thus, no major improvements to the existing transit facilities would be necessary with the near-term projects.

IMPACT TRANS-3: Based on the above discussion, the project would not result in significant impacts to the availability of pedestrian, bicycle or transit services. (Less Than Significant Impact)

Parking

The project would be required to provide parking in accordance with the City's parking standards (Municipal Code Section 19.46.050). Parking for each of the development projects would be provided through a combination of surface parking lots and at-grade parking lots underneath the landscape podiums of the condominium buildings. The two development projects would provide adequate parking, in accordance with the City's standards. The projects, therefore, would not result in significant parking overflow or safety impacts.

IMPACT TRANS-4: The proposed project would provide adequate parking. (Less Than Significant Impact)

2.6.3 General Plan Policies and Actions

The policies and actions of the City of Sunnyvale General Plan have been adopted for the purpose of avoiding or mitigating potential environmental effects resulting from planned development within the City. The City of Sunnyvale General Plan *Land Use and Transportation Element* (adopted 1997) contains policies and action statements related to transportation and traffic circulation. Conformance with the following General Plan policies and actions from the *Land Use and Transportation Element* will reduce or avoid transportation impacts:

Transportation Action Statement R1.3.2 promotes shorter commute trips and ease congestion by advocating that all communities provide housing and employment opportunities.

Transportation Policy R1.4 states that the City should achieve an operating level of service (LOS) E or better for all regional roadways and intersections, as defined by the City functional classification of the street system.

Transportation Policy R1.7 states that the City should contribute to efforts to minimize region-wide average trip length, and single-occupant vehicle trips.

Efficient Transportation Policy C3.1 states that the City should achieve an operating level of service (LOS) of D or better on the City-wide roadways and intersections, as defined by the functional classification of the street system.

2.6.4 Mitigation and Avoidance Measures

2.6.4.1 Mitigation Measures for Build-out Under the Proposed ITR General Plan Amendment Scenario

Fair Oaks Avenue and Arques Avenue

MITIGATION MEASURE TRANS-1: The LOS impact could be mitigated by providing an exclusive eastbound right-turn lane. The mitigation includes reconstructing the eastbound leg of the intersection, which would entail removal of street parking, shifting and reducing the width of the travel lanes, and/or acquiring some right-of-way. Reconfiguring the eastbound leg would involve re-striping and traffic signal modifications. This mitigation measure would improve the intersection level of service to better than 2020 baseline conditions.

Stewart Drive and Duane Avenue

MITIGATION MEASURE TRANS-2: The LOS impact could be mitigated by converting the westbound shared through/right-turn lane into an exclusive right-turn lane, and converting the shared through/left-turn lane into a shared left/through/right lane. This improvement would require signal modifications and re-striping only; no additional right-of-way would be required. This mitigation measure would improve the intersection level of service from LOS F to an acceptable LOS D. The project proponents on the overall ITR site would be required to contribute their proportionate fair-share of funds to implement the necessary improvements.

2.6.4.2 Mitigation Measures for AMD Property and Taylor Woodrow Property Specific Development Projects

No additional mitigation for the specific development projects is required or identified. These two projects would be required to contribute their proportionate fair-share of funds towards the improvements described above for the overall General Plan Amendment scenario.

2.6.5 Conclusion

TRANS-1: With implementation of the above mitigation measures, future build-out of the site under the proposed GPA scenario would not result in significant impacts to City of Sunnyvale intersections. **(Less Than Significant Impact with Mitigation Incorporated)**

TRANS-2: All of the signalized study intersections would continue to operate at acceptable levels of service during both the AM and PM peak hours of traffic under near-term project conditions. For this reason, the proposed near-term development projects would not result in significant near-term traffic impacts. **(Less Than Significant Impact)**

TRANS-3: Based on the above discussion, the project would not result in significant impacts to the availability of pedestrian, bicycle or transit services. **(Less Than Significant Impact)**

TRANS-4: The proposed project would provide adequate parking. **(Less Than Significant Impact)**

2.7 AIR QUALITY

The following discussion is based on an air quality analysis completed by *Donald Ballanti, Certified Consulting Meteorologist* in April 2006. The complete analysis is provided in Appendix G of this EIR.

2.7.1 Setting

2.7.1.1 Air Pollution Climatology

Air quality and the amount of a given pollutant in the atmosphere are determined by the amount of pollutant released and the atmosphere's ability to transport and dilute the pollutant. The major determinants of transport and dilution are wind, atmospheric stability, terrain and for photochemical pollutants, sunshine.

Northwest winds and northerly winds are most common in Sunnyvale, reflecting the orientation of the Bay and the San Francisco Peninsula. Winds from these directions carry pollutants released by autos and factories from upwind areas of the Peninsula towards Sunnyvale, particularly during the summer months. Winds are lightest on the average in fall and winter. Every year in the fall and winter, there are periods of several days when winds are very light and local pollutants build up.

Pollutants can be diluted by mixing in the atmosphere both vertically and horizontally. Vertically mixing and dilution of pollutants is often suppressed by inversion conditions, when a warm layer of air traps cooler air close to the surface. During the summer, inversions are generally elevated above ground level, but are present over 90 percent of the time in both the morning and afternoon. In winter, surface-based inversions dominate in the morning hours, but frequently dissipate by afternoon.

Topography can restrict horizontal dilution and mixing of pollutants by creating a barrier to air movement. While Sunnyvale itself has relatively flat terrain, the larger south bay sub-air basin has significant terrain features that affect air quality. The Santa Cruz Mountains and Hayward Hills on either side of the South Bay tend to restrict horizontal dilution, and this alignment of the terrain also channels winds from the north to south, carrying pollution from the northern Peninsula towards Sunnyvale.

The combined effects of moderate ventilation, frequent inversions that restrict vertical dilution and terrain that restricts horizontal dilution give Sunnyvale a relatively high atmospheric potential for pollution.

2.7.1.2 Ambient Air Quality Standards

Criteria Pollutants

Both the USEPA and the California Air Resources Board have established air quality standards for common pollutants. These ambient air quality standards are levels of contaminants which represent safe levels that avoid specific adverse health effects associated with each pollutant. The ambient air quality standards cover what are called "criteria" pollutants because the health and other effects of each pollutant are described in criteria documents. Table 16 identifies the major criteria pollutants, characteristics, health effects

and typical sources. The Federal and State ambient air quality standards are summarized in Table 17.

TABLE 16:
MAJOR CRITERIA POLLUTANTS

Pollutant	Characteristics	Health Effects	Major Sources
Ozone	A highly reactive photochemical pollutant created by the action of sunshine on ozone precursors, primarily reactive hydrocarbons and oxides of nitrogen. Often called photochemical smog.	Eye irritation Respiratory function impairment	The major sources ozone precursors are combustion sources such as factories and automobiles, and evaporation of solvents and fuels.
Carbon Monoxide	Carbon monoxide is an odorless, colorless gas that is highly toxic. It is formed by the incomplete combustion of fuels.	Impairment of oxygen transport in the bloodstream Aggravation of cardiovascular disease Fatigue, headache, confusion, dizziness Can be fatal in the case of very high concentrations	Automobile exhaust, combustion of fuels, combustion of wood in woodstoves and fireplaces.
Nitrogen Dioxide	Reddish-brown gas that discolors the air, formed during combustion.	Increased risk of acute and chronic respiratory disease	Automobile and diesel truck exhaust, industrial processes, fossil-fueled power plants.
Sulfur Dioxide	Sulfur dioxide is a colorless gas with a pungent, irritating odor.	Aggravation of chronic obstruction lung disease Increased risk of acute and chronic respiratory disease	Diesel vehicle exhaust, oil-powered power plants, industrial processes.
Particulate Matter	Solid and liquid particles of dust, soot, aerosols and other matter which are small enough to remain suspended in the air for a long period of time.	Aggravation of chronic disease and heart/lung disease symptoms	Combustion, automobiles, field burning, factories and unpaved roads. Also a result of photochemical processes.

TABLE 17: FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS			
Pollutant	**Averaging Time**	**Federal Primary Standard***	**State Standard**
Ozone	1-Hour 8-Hour	0.12 PPM 0.08 PPM	0.09 PPM --
Carbon Monoxide	1-Hour 8-Hour	35.0 PPM 9.0 PPM	20.0 PPM 9.0 PPM
Nitrogen Dioxide	Annual Average 1-Hour	0.05 PPM --	-- 0.25 PPM
Sulfur Dioxide	Annual Average 24-Hour 1-Hour	0.03 PPM 0.14 PPM --	-- 0.05 PPM 0.25 PPM
PM_{10}	Annual Average 24-Hour	50 $\mu g/m^3$ 150 $\mu g/m^3$	20 $\mu g/m^3$ 50 $\mu g/m^3$
Vinyl Chloride	24-Hour	0.01 PPM	--
Notes: PPM = Parts per Million; $\mu g/m^3$ = Micrograms per Cubic Meter			

The Federal and State ambient standards were developed independently with differing purposes and methods, although both processes attempted to avoid health-related effects. As a result, the Federal and State standards differ in some cases. In general, the California State standards are more stringent. This is particularly true for ozone and particulate matter (PM_{10} and $PM_{2.5}$).

The USEPA established new national air quality standards for ground-level ozone and for fine particulate matter in 1997. The existing 1-hour ozone standard of 0.12 PPM microns or less is to be phased out and replaced by an 8-hour standard of 0.08 PPM. Implementation of the 8-hour standard was delayed by litigation, but was determined to be valid and enforceable by the US Supreme Court in a decision issued in February of 2001.

Suspended particulate matter (PM) is a complex mixture of tiny particles that consists of dry solid fragments, soil cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size and chemical composition, and can be made up of many different materials such as metals, soot, soil, and dust. "Inhalable" PM consists of particles less than ten microns in diameter, and is defined as "suspended particulate matter" or PM_{10}. Fine particles are less than 2.5 microns in diameter ($PM_{2.5}$). $PM_{2.5}$, by definition is included in PM_{10}.

In 1997 new national standard for fine particulate matter (diameter 2.5 microns or less) were adopted for 24-hour and annual averaging periods. The current PM_{10} standards were to be retained, but the method and form of determining compliance with the standards were revised.

The State of California regularly reviews scientific literature regarding the health effects and exposure to PM and other pollutants. On May 3, 2002, the California Air Resources Board (CARB) staff recommended lowering the level of the annual standard for PM_{10} and establishing a new annual standard for $PM_{2.5}$ (particulate matter 2.5 micrometers in diameter and smaller). The new standards became effective on July 5, 2003.

Toxic Air Contaminants

In addition to the criteria pollutants discussed above, Toxic Air Contaminants (TACs) are another group of pollutants of concern. There are many different types of TACs, with varying degrees of toxicity. Sources of TACs include industrial processes such as petroleum refining and chrome plating operations, commercial operations such as gasoline stations, and motor vehicle exhaust. Cars and trucks release at least 40 different toxic air contaminants. The most important, in terms of health risk, are diesel particulate, benzene, formaldehyde, 1,3-butadiene and acetaldehyde.

Public exposure to TACs can result from emissions from normal operations, as well as accidental releases. Health effects of TACs include cancer, birth defects, neurological damage and death.

2.7.1.3 Ambient Air Quality

Criteria Air Pollutants

The Bay Area Air Quality Management District (BAAQMD) monitors air quality at several locations within the San Francisco Bay Air Basin. The Bay Area Air Quality Management District monitors for a single pollutant (ozone) at 910 Ticonderoga Drive in Sunnyvale. The closest multi-pollutant monitoring site to the project site was located in downtown San José. Table 18 summarizes exceedances of State and Federal standards at this monitoring site during the period 2003-2005. Table 18 shows that ozone and PM_{10} exceed the State standards in the South Bay. Violations of the carbon monoxide standards had been recorded at the downtown San José site prior to 1992.

Of the three pollutants know to at time exceed the State and Federal standards in the project area, two are regional pollutants. Both ozone and particulate matter (PM_{10} and $PM_{2.5}$) are considered regional pollutants in that concentrations are not determined by proximity to individual sources, but show a relative uniformity over a region. Thus, the data shown in Table 18 for ozone and PM_{10} provide a good characterization of levels of these pollutants on the project site.

Carbon monoxide is a local pollutant, i.e., high concentrations are normally only found very near sources. The major source of carbon monoxide is automobile traffic. Elevated concentrations, therefore, are usually only found near areas of high traffic volumes.

Toxic Air Contaminants

The State Air Resources Board and BAAQMD's inventory of TAC sources identifies 71 sources of TACs within Sunnyvale. The majority of these sources are microelectronic industries, dry cleaners, and auto repair businesses.

Of the 71 known TAC sources located in Sunnyvale, only Lockheed Missiles and Space was designated by BAAQMD as a high priority source based on the types and amounts of contaminants emitted. The results of the health risk assessment for this source classified this source as having a Level 0 impact, which is defined as a calculated maximum cancer risk of less than 10 in a million.[9]

TABLE 18:
SUMMARY OF AIR QUALITY DATA FOR THE SAN JOSÉ CENTRAL STATION

Pollutant	Standard	Days Exceeding Standard in:		
		2003	2004	2005
Ozone	State 1-Hour	4	0	1
Ozone	Federal 1-Hour	0	0	0
Ozone	Federal 8-Hour	0	0	0
Carbon Monoxide	State-Federal 8-Hour	0	0	0
Nitrogen Dioxide	State-Federal 1 Hour	0	0	0
PM_{10}	State 24-Hour	3	4	1
PM_{10}	Federal 24-Hour	0	0	0
$PM_{2.5}$	Federal 24-Hour	0	0	0

Source: California Air Resources Board, Aerometric Data Analysis and Management System, http://www.arb.ca.gov./adam/cgi-bin/adamtop/d2wstart, 2006.

2.7.1.4 Attainment Status and Regional Air Quality Plans

The Federal Clean Air Act and the California Clean Air Act of 1988 require that the State Air Resources Board, based on air quality monitoring data, designate portions of the State where the Federal or State ambient air quality standards are not met as "nonattainment areas." Because of the differences between the national and State standards, the designation of nonattainment areas is different under the Federal and State legislation.

In June of 1998, the USEPA reclassified the Bay Area from "maintenance area" to nonattainment area for ozone, based on violations of the Federal standard at several locations in the air basin. This reversed the air basin's reclassification to "maintenance area" for ozone in 1995. Reclassification requires an update to the region's Federal air quality plan.

Under the California Clean Air Act, Santa Clara County is a nonattainment area for ozone and PM_{10}. The County is either an attainment area or unclassified for other pollutants. The California Clean Air Act requires local air pollution control districts to prepare air quality

[9] City of Sunnyvale. Air Quality Sub-Element of the General Plan. July 1993. Page (3.7) 23.

attainment plans. These plans must provide for district-wide emission reductions of five percent per year averaged over consecutive three-year period or if not, provide for adoption of "all feasible measures on an expeditious schedule."

2.7.1.5 Sensitive Receptors

The BAAQMD defines sensitive receptors as facilities where sensitive population groups (children, the elderly, the acutely ill and the chronically ill) are located. These land uses include residences, school playgrounds, child-care centers, retirement homes, convalescent homes, hospitals and medical clinics. Sensitive receptors near the project site include adjacent residential uses to the north and west. Two schools (Kings Academy and Rainbow Montessori School) are also located immediately west of the project site.

2.7.2 Air Quality Impacts

2.7.2.1 Thresholds of Significance

General Plan Amendment

Based on BAAQMD guidelines, a General Plan or amendment to a General Plan is determined to be inconsistent with the most current Clean Air Plan (CAP), and therefore, to have a significant air quality impact, if the plan or plan change would:

- Result in population growth that would exceed the values included in the current Clean Air Plan (CAP) for the City of Sunnyvale; and
- Cause the rate of increase in vehicle miles traveled (VMT) to be greater than the rate of increase in population.

Specific Development Projects

For the purpose of this project, an air quality impact is considered significant if the project would:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or project air quality violation;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);
- Expose sensitive receptors to substantial pollutant concentrations; or
- Create objectionable odors affecting a substantial number of people.

2.7.2.2 Impacts from General Plan Amendment and Specific Development Projects

Clean Air Plan

The project proposes to amend the General Plan to allow for the redevelopment of the site with residential and commercial development. The proposed project would allow for an increase in the residential holding capacity allowed under build-out of the General Plan and thus, would increase population. The proposed project would also intensify the use of the project site, therefore, generating more daily traffic trips to and from the project site. The development of residential uses in Sunnyvale, however, would reduce commute travel time and distances. Since the in-commute of vehicles traveling to jobs in Sunnyvale from residences in distant locations contributes to the regional air quality problems, placing dwelling units in Sunnyvale would be expected to result in incremental benefits to regional air quality. Although there is no assurance that the residents on this site would move here from more distant locations, providing the opportunity for them to do so is consistent with Clean Air Plan (CAP) policies.

IMPACT AIR-1: Based on the discussion above, while the proposed land use change would add additional population, it would not be inconsistent with the policies of the Clean Air Plan. (Less Than Significant Impact)

Regional Air Quality Impacts

The BAAQMD has established thresholds for what would be considered a significant addition to existing air pollution. Reactive organic gases (ROG)[10], nitrogen oxides (NO_x), and sulfur oxides (SO_x), are known as "regional pollutants." A project that generates more than 80 pounds per day of ROG, nitrogen oxides or PM_{10} is considered to have a significant impact on regional air quality, according to BAAQMD guidelines. In order to exceed the 80 pounds per day threshold, a typical project must generate at least 2,000 additional daily vehicle trips. BAAQMD generally does not recommend a detailed air quality analysis for projects generating less than 2,000 vehicle trips per day, unless warranted by the specific nature of the project setting.[11] The proposed project would allow for the redevelopment of the industrial site with residential units. As discussed in *Section 2.6 Transportation*, the two proposed development projects would generate approximately 2,161 net new average daily trips. The overall conversion and redevelopment of the site with residential uses would generate a net of 5,150 new average daily trips.

Vehicle trips generated by the project would result in air pollutant emissions affecting the entire San Francisco Bay Air Basin. Emissions from existing uses that would be removed from the site were also estimated, and the net change calculated for the near term project (AMD and Taylor-Woodrow sites) and for ultimate build-out under the proposed GPA scenario. Refer to Appendix G for additional detail regarding the methodology used in estimating regional emissions.

[10] Reactive Organic Gases are classes of organic chemical compounds, containing carbon, which react rapidly in the atmosphere to form photochemical smog, or ozone.
[11] Bay Area Air Quality Management District. CEQA Guidelines. December 1999.

As shown in Table 19, emissions resulting from the two near-term development projects (AMD and Taylor-Woodrow sites) would not exceed the BAAQMD thresholds. Buildout of the site under the proposed GPA scenario, however, would result in reactive organic gas emissions exceeding the thresholds of significance. Therefore, the proposed GPA would have a significant effect on regional air quality.

IMPACT AIR-2: The net increase in emissions resulting from the near-term projects, as shown on Table 19, would not exceed the threshold of significance for reactive organic gases, nitrogen oxides and PM_{10}. Therefore, the proposed development projects would not have a significant impact on regional air quality. (Less Than Significant Impact) The long-term GPA scenario would generate an increase in emissions exceeding the thresholds of significance for reactive organic gases. Therefore, the proposed GPA scenario would have a significant impact on regional air quality. (Significant Impact)

TABLE 19:
GPA SCENARIO AND NEAR-TERM PROJECTS
REGIONAL EMISSIONS IN POUNDS PER DAY

	Reactive Organic Gases	Nitrogen Oxides	PM_{10}
Near-Term Development Projects			
Existing Industrial Uses	11.2	12.1	9.5
Proposed Development Projects	59.9	35.2	31.8
Net Increase	**48.7**	**23.1**	**22.3**
Long-Term GPA Scenario			
Existing Industrial Uses	87.7	96.0	168.0
Build-out under GPA Scenario	248.3	115.1	181.8
Net Increase	**160.6**	**19.1**	**13.8**
BAAQMD Significance Threshold	**80.0**	**80.0**	**80.0**

Local Air Quality Impacts

On the local scale, the project would increase traffic on the local street network, thereby increasing carbon monoxide levels along roadways used by project traffic. The primary source of carbon monoxide in the Bay Area is automobiles. Concentrations of this gas are highest near intersections of major roads.

Carbon monoxide concentrations under worst-case meteorological conditions have been predicted for signalized intersections affected by project. These intersections were selected as having the worst intersection LOS and highest average delay. PM peak traffic volumes were applied to a screening form of the CALINE 4 dispersion model to predict maximum 1- and 8-hour concentrations near these intersections. The model results were used to predict the maximum 1- and 8-hour concentrations, corresponding to the 1- and 8-hour averaging times specified in the State and Federal ambient air quality standards for carbon monoxide.

Table 20 shows the results of the CALINE-4 analysis for the peak 1-hour and 8-hour traffic periods in parts per million (PPM). The 1-hour values are to be compared to the Federal 1-hour standard of 35 PPM and the State standard of 20 PPM. The 8-hour values in Table 20 are to be compared to the State and Federal standard of nine (9) PPM.

TABLE 20:
WORST CASE CARBON MONOXIDE CONCENTRATIONS NEAR SELECTED INTERSECTIONS (IN PPM)

Intersection	Existing		Existing + Near-Term Project		Existing + Long-Term GPA Project	
	1-Hr.	8-Hr.	1-Hr.	8-Hr.	1-Hr.	8-Hr.
Lawrence/Arques	13.4	8.0	13.4	8.0	8.9	5.1
Lawrence/Oakmead	13.7	8.2	13.8	8.3	9.3	5.4
Lawrence/Kifer	13.6	8.1	13.6	8.1	8.8	5.0
Duane/Stewart	10.3	5.8	10.3	5.9	8.3	4.6
Lawrence/Tasman	12.0	7.0	12.0	7.1	8.4	4.8
Lawrence/Lakehaven	11.2	6.5	11.2	6.5	8.5	4.8
Most Stringent Standard	**20.0**	**9.0**	**20.0**	**9.0**	**20.0**	**9.0**

Table 20 shows both existing and predicted project-level concentrations near the listed intersections. Carbon monoxide concentrations are shown to meet the 1-hour and 8-hour standards. Traffic from the proposed near-term projects would increase concentrations by up to 0.1 PPM, but concentrations would remain below the most stringent State or Federal standards. Concentrations under buildout of the proposed GPA scenario would also not exceed the state/Federal ambient air quality standards in the year 2020. Since project traffic would not cause any new violations of the 8-hour standards for carbon monoxide, nor contribute substantially to an existing or projected violation, project impacts on local carbon monoxide concentrations are considered to be less-than-significant.

IMPACT AIR-3: Neither the near-term projects nor build-out under the proposed GPA scenario would cause any new violations of the Federal or State standards for carbon monoxide nor contribute substantially to an existing or projected violation. (Less Than Significant Impact)

Short-Term Demolition and Construction Impacts

Construction Dust

The proposed project would require demolition of existing buildings on the site, as redevelopment of each area occurs. The physical demolition of existing structures and other infrastructure are construction activities with a high potential for creating air pollutants. In addition to the dust created during demolition, substantial dust emissions could be created as debris is loaded into trucks for disposal or during on-site crushing and recycling of concrete and asphalt rubble. The control of emissions from processing of recycled materials is accomplished through BAAQMD's permit process or the state's portable equipment statewide registration program (mitigations or permit conditions typically require *Best Available Control Technology*, which for portable equipment is defined as dust suppression through regular watering of debris piles and use of continuous water sprays on crushing equipment).

After removal of existing structures, construction dust would continue to affect local air quality during construction of each development project on the site. Grading, earthmoving and excavation are the activities that generate the most PM_{10} emissions. Construction activities would generate exhaust emissions from vehicles/equipment and fugitive particulate matter emissions that would affect local air quality. Construction activities are also a source of organic gas emissions. Solvents in adhesives, non-waterbase paints, thinners, some insulating materials and caulking materials would evaporate into the atmosphere and would participate in the photochemical reaction that creates urban ozone. Asphalt used in paving is also a source of organic gases for a short time after its application. In addition, construction of the project is anticipated to require a substantial number of truck and vehicle trips to and from the site during all phases of demolition and construction activities. These volumes will not, however, exceed the number of daily trips generated by the project at full buildout and they will end before the project is complete.

Construction dust could affect local air quality during implementation of the project. The dry, windy climate of the area during the summer months creates a high potential for dust generation when and if underlying soils are exposed to the atmosphere.

IMPACT AIR-4: The effects of demolition and construction activities would be increased dustfall and locally elevated levels of PM_{10} downwind of construction activity. Construction dust may impact nearby properties, particularly the existing residential areas to the north, northwest and east. (Significant Impact)

Construction TAC Emissions

During construction various diesel-powered vehicles and equipment would be used on the site. In 1998 the California Air Resources Board identified particulate matter from diesel fueled engines as a toxic air contaminant (TAC). CARB has completed a risk management process that identified potential cancer risks for a range of activities using diesel-fueled engines. High volume freeways, stationary diesel engines and facilities attracting heavy and constant diesel vehicle traffic (distribution centers, truck stops) were identified as having the highest associated risk.

Health risks from TACs are a function of both concentration and duration of exposure. Unlike the above types of sources, construction diesel emissions are temporary, affecting an area for a period of weeks at any one location. In addition, construction-related sources are mobile and transient in nature, and the bulk of the emissions occur within the project site at a substantial distance from most nearby receptors. The prevailing wind direction is from the northwest, which means that the exposure to construction emissions would be greatest southeast of construction activity where there are no sensitive land uses. Because of its short duration and the fact that nearby sensitive receptors would not be down-wind of construction activity when the wind is from the prevailing northwest direction, health risks from construction emissions of diesel particulates would not be significant.

IMPACT AIR-5: The project would not result in significant toxic air contaminant (TAC) impacts from construction activities. (Less Than Significant Impact)

2.7.3 General Plan Policies and Actions

The policies and actions of the City of Sunnyvale General Plan have been adopted for the purpose of avoiding or mitigating potential environmental effects resulting from planned development within the City. The City of Sunnyvale General Plan *Air Quality Sub-Element* (adopted 1993) contains policies and action statements related to air quality. Conformance with the following General Plan policies and actions from the *Air Quality Sub-Element* will reduce or avoid air quality impacts:

Air Quality Policy A.1 states that the City should require all new development to utilize site planning to protect citizens from unnecessary exposure to air pollutants.

Air Quality Action A.1.c states that new residential development should be located at least 15 feet from the property line along major streets or intersections unless a lesser distance can be demonstrated to not expose residents to unhealthful pollutant concentrations.

Air Quality Policy A.2 states that the City should reduce automobile emissions through traffic and transportation improvements. Since traffic congestion delays increase the level of emissions, congestion management has air quality benefits.

Air Quality Policy C.2 states that the City should improve opportunities for citizens to live and work in close proximity.

Air Quality Action C.2.a states that in the long term, the City should encourage a better balance between jobs and housing than currently exists in Sunnyvale to reduce long distance commuting.

2.7.4 Mitigation and Avoidance Measures

2.7.4.1 Future Redevelopment on the Site

The following mitigation measure will be incorporated as part of the future development to further minimize impacts to air quality:

MITIGATION MEASURE AIR-1: Any future development under the proposed General Plan designation would be subject to the City's grading ordinance; all earth moving activities shall include requirements to control fugitive dust, including regular watering of the ground surface, cleaning nearby streets, damp sweeping, and planting any areas left vacant for extensive periods of time.

2.7.4.2 Mitigation Measures Proposed to be Included in the Specific Development Projects

Residential and Commercial Development

MITIGATION MEASURE AIR-2: The project shall include and implement measures identified by the BAAQMD to reduce emissions at the permit stage for each redevelopment project, to the satisfaction of the Director of Community Development and the Transportation and Traffic Manager, including the following:

- Provide bicycle lanes, sidewalks and/or paths, connecting project residences to adjacent schools, parks, the nearest transit stops and nearby commercial areas.
- Provide secure and conveniently placed bicycle parking and storage facilities at parks, stores, and other facilities in conformance with the requirements of the Zoning Ordinance.
- Provide retail shops and services within or adjacent to residential project.
- Provide physical improvements, such as sidewalk improvements, landscaping and bicycle parking that would act as incentives for pedestrian and bicycle modes of travel.
- Provide transit information kiosks and bus stop amenities that would act as incentives for transit travel.
- Provide traffic signal interconnection.
- Provide preferential parking for electric or alternatively-fueled vehicles in the commercial development.

Demolition and Construction

The following provisions to control dust and exhaust emissions shall be followed during all site excavation, grading and construction activities:

MITIGATION MEASURE AIR-3: All construction vehicles shall be properly maintained and equipped with exhaust mufflers that meet State standards.

MITIGATION MEASURE AIR-4: Newly disturbed soil surfaces shall be watered down regularly by a water truck(s) or by other approved method maintained on site during all grading operations. Construction grading activity shall be discontinued in wind conditions that in the opinion of the Public Works Construction Inspector cause excessive neighborhood dust problems. Wash down of dirt and debris into storm drain systems shall not be allowed.

MITIGATION MEASURE AIR-5: Construction activities shall be scheduled so that paving and foundation placement begin immediately upon completion of grading operations.

MITIGATION MEASURE AIR-6: All aggregate materials transported to and from the site shall be covered in accordance with Section 23114 of the California Vehicle Code during transit to and from the site.

MITIGATION MEASURE AIR-7: The BAAQMD has prepared a list of feasible construction dust control measures that can reduce construction impacts to a level of less than significant. The following construction practices required by the City of Sunnyvale meet or exceed the BAAQMD feasible construction dust control measures and will be implemented during all phases of construction on the project site:

- Use dust-proof chutes for loading construction debris onto trucks.
- Water to control dust generation during demolition of structures and break-up of pavement.
- Water or cover stockpiles of debris, soil, sand or other materials that can be blown by the wind.
- Cover all trucks hauling demolition debris, soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard.
- Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.
- Sweep streets daily (preferably with water sweepers) all paved access road, parking areas and staging areas at construction site.
- Hydroseed or apply non-toxic soil stabilizers to inactive construction areas.
- Limit traffic speed on unpaved roads to 15 mph.

- Install sandbags or other erosion control measures to prevent silt runoff to public roadways.

- Replant vegetation in disturbed areas as quickly as possible.

MITIGATION MEASURE AIR-8: Address dust or complaints regarding dust within 24 hours to the satisfaction of City staff (or other authority).

2.7.5 Conclusion

AIR-1: Based on the discussion above, while the proposed land use change would add additional population, it would not be inconsistent with the policies of the Clean Air Plan. **(Less Than Significant Impact)**

AIR-2: The net increase in emissions resulting from the near-term projects would not exceed the threshold of significance for reactive organic gases, nitrogen oxides and PM_{10}. Therefore, the proposed development projects would not have a significant impact on regional air quality. **(Less Than Significant Impact)** The long-term GPA scenario, however, would generate an increase in emissions exceeding the thresholds of significance for reactive organic gases. Therefore, the proposed GPA scenario would have a significant long-term impact on regional air quality. **(Significant Unavoidable Impact)**

AIR-3: Neither the near-term projects nor build-out under the proposed GPA scenario would cause any new violations of the Federal or State standards for carbon monoxide nor contribute substantially to an existing or projected violation. **(Less Than Significant Impact)**

AIR-4: With the implementation of the above described mitigation measures construction-related air quality impacts would be reduced to a less than significant level. **(Less Than Significant Impact with Mitigation Incorporated)**

AIR-5: The project would not result in significant toxic air contaminant (TAC) impacts from construction activities. **(Less Than Significant Impact)**

2.7.6 Additional Mitigation Measures Not Currently Proposed Which Could be Required

The BAAQMD has identified additional mitigation measures for reducing vehicle emissions from projects. Additional mitigation measures to reduce vehicle emissions for the residential portions of the project could include:

- Provide a satellite tele-commute center within or near the development.
- Allow only natural gas fireplaces, pellet stoves or EPA-Certified wood-burning fireplaces or stoves in residences. Conventional open-hearth fireplaces should not be permitted. EPA-Certified fireplaces and fireplace inserts are 75 percent effective in reducing emissions from this source.
- Require outside power receptacles that would allow use of electric lawn and garden equipment for landscaping. Construct transit amenities such as bus turnouts/bus bulbs, benches, shelters, etc.

- Utilize reflective (or high albedo) and emissive roofs and light colored construction materials to increase the reflectivity of roads, driveways, and other paved surfaces, and include shade trees near buildings to directly shield them from the sun's rays and reduce local air temperature and cooling energy demand.

The above measures, in combination with the measures listed above, have the potential to reduce project-related regional emissions by 10-20 percent. Even with a reduction of this magnitude, project emissions would remain well above the BAAQMD significance threshold of 80 pounds per day. Therefore, the project's regional air quality impacts would remain significant after mitigation. **(Significant Unavoidable Impact)**

2.8 NOISE

The following discussion is based on a noise analysis completed by *Illingworth & Rodkin, Inc.* in July 2006. The complete noise analysis is provided in Appendix H of this EIR.

2.8.1 Setting

2.8.1.1 Background Information

Several factors influence sound as it is perceived by the human ear, including the actual level of sound, the period of exposure to the sound, the frequencies involved, and fluctuation in the noise level during exposure. Noise is measured on a "decibel" scale which serves as an index of loudness. Because the human ear cannot hear all pitches or frequencies, sound levels are frequently adjusted or weighted to correspond to human hearing. This adjusted unit is known as the "A-weighted" decibel or dBA. Further, sound is averaged over time and penalties are added to the average for noise that is generated during times that may be more disturbing to sensitive uses such as early morning, or late evening.

Since excessive noise levels can adversely affect human activities (such as conversation and sleeping) and human health, Federal, state, and local governmental agencies have set forth criteria or planning goals to minimize or avoid these effects. The noise guidelines are almost always expressed using one of several noise averaging methods, such as L_{eq}, L_{dn}, or CNEL.[12] Using one of these descriptors is a way for a location's overall noise exposure to be measured, realizing of course that there are specific moments when noise levels are higher (e.g., when a jet is taking off or when a leaf blower is operating) and specific moments when noise levels are lower (e.g., during lulls in traffic flows on US 101 or in the middle of the night). For this report, the L_{dn} will be used as it is consistent with the guidelines for the City of Sunnyvale and the State of California.

2.8.1.2 Applicable Noise Standards and Policies

City of Sunnyvale General Plan and State Authority

The Noise Element of the City's General Plan relies on the State of California published guidelines for noise compatible land use planning. Generally, exterior noise exposures fall into three categories: normally acceptable, conditionally acceptable, and unacceptable. The noise guidelines are expressed in terms of the L_{dn}. For residential land uses, normally acceptable noise levels are up to 60 dBA, conditionally acceptable noise level range between 60 dBA to 75 dBA, and unacceptable noise levels are 75 dBA and above.

[12] **L_{eq}** stands for the Noise Equivalent Level and is a measurement of the average energy level intensity of noise over a given period of time such as the noisiest hour. **L_{dn}** stands for Day-Night Level and is a 24-hour average of noise levels, with a 10 dB penalty applied to noise occurring between 10:00 PM and 7:00 AM. **CNEL** stands for Community Noise Equivalent Level; it is similar to the L_{dn} except that there is an additional five dB penalty applied to noise which occurs between 7:00 PM and 10:00 PM. As a general rule of thumb where traffic noise predominates, the CNEL and L_{dn} are typically within two dBA of the peak-hour L_{eq}.

Noise Insulation Requirements (Title 24)

The California Code of Regulations (CCR) protects interiors of new multi-family dwellings from excessive noise. These requirements apply to townhouses, condominiums, apartments, group care homes, hotels, motels, and all other dwellings except single-family detached homes. The law requires that: 1) interior noise levels cannot exceed an L_{dn} of 45 dBA with doors and windows closed; and 2) a residential site with an outdoor L_{dn} above 60 dBA needs a detailed noise study which shows how the dwelling units will meet an interior L_{dn} of 45 dBA.

2.8.1.3 Existing Noise Conditions

While occasional aircraft overflights are audible, vehicle traffic noise is the primary source of noise in the vicinity of the project. The site is outside of the 65 CNEL contour of Moffett Field. Norman Y. Mineta San Jose International Airport is about three miles east of the site, which also places the project site well outside that airport's 65 CNEL noise contour. A survey of existing industrial uses on the project site did not reveal any significant stationary noise sources.

A noise monitoring survey was performed to quantify the existing noise environment on the project site. Four long-term noise measurements (24-hour durations) and five short-term noise measurements (10-minute durations) were conducted at representative locations to complete the noise monitoring survey. Noise measurement locations are shown on Figure 15.

Long-term noise measurement LT-1 was made approximately 70 feet from the centerline of North Wolfe Road. The primary noise source at this location is vehicular traffic along North Wolfe Road, with some construction noise in the background. Daytime hourly average noise levels ranged from 65 to 70 dBA L_{eq} and nighttime hourly average noise levels ranged from 52 to 65 dBA. The day-night average noise level for the measurement was 67 dBA L_{dn}.

Measurement location LT-2 was approximately 33 feet from the centerline of Stewart Drive. The major noise source at this location was local vehicle traffic on Stewart Drive. Daytime hourly average noise levels ranged from 60 to 67 dBA L_{eq} and nighttime hourly average noise levels ranged from 52 to 65 dBA. The day-night average noise level for the measurement was 67 dBA L_{dn}.

Measurement location LT-3 was approximately 51 feet from the centerline of East Duane Avenue. The primary noise source at this location was local vehicular traffic on East Duane Avenue. Daytime hourly average noise levels ranged from 64 to 70 dBA L_{eq} and nighttime hourly average noise levels ranged from 54 to 64 dBA. The day-night average noise level for the measurement was 69 dBA L_{dn}.

Measurement location LT-4 was approximately 132 feet from the centerline of the Lawrence Expressway. The primary noise source at this location was local vehicular traffic on Lawrence Expressway. Daytime hourly average noise levels ranged from 68 to 71 dBA L_{eq} and nighttime hourly average noise levels ranged from 62 to 70 dBA. The day-night average noise level for the measurement was 73 dBA L_{dn}.

Five short-term measurements were also taken in the vicinity of the site. Locations for the short-term measurements are also shown in Figure 15. Short-term measurement one (ST-1) was made at LT-1 location, about five feet above the ground. The primary noise source during the measurement was vehicle traffic along Wolfe Road. The ten-minute average noise level for the measurement was 65 dBA L_{eq}. The estimated day-night average noise level for the measurement was 66 dBA L_{dn}. Short-term measurement two (ST-2) was about 36 feet from the centerline of DeGuigne Drive. The primary noise source during the measurement was vehicle traffic along the roadway. The ten-minute average noise level for the measurement was 64 dBA L_{eq}. The estimated day-night average noise level for the measurement was 66 dBA L_{dn}. Short-term measurement three (ST-3) was about 45 feet from the centerline of Stewart Drive. The primary noise source during the measurement was vehicle traffic along Stewart Drive. The maximum noise level for the measurement was generated by a motorcycle passby and was about 69 dBA. The ten-minute average noise level for the measurement was 60 dBA L_{eq}. The estimated day-night average noise level for the measurement was 61 dBA L_{dn}. Short-term measurement four (ST-4) was made at LT-4 location, about five feet above the ground. The primary noise source during the measurement was vehicle traffic along Lawrence Expressway. The ten-minute average noise level for the measurement was 68 dBA L_{eq}. The estimated day-night average noise level for the measurement was 72 dBA L_{dn}. Short-term measurement five (ST-5) was about 60 feet from the centerline of East Duane Avenue. The primary noise source during the measurement was vehicle traffic along East Duane Avenue. The ten-minute average noise level for the measurement was 66 dBA L_{eq}. The estimated day-night average noise level for the measurement was 68 dBA L_{dn}. These noise measurements are summarized in Table 21.

TABLE 21:
NOISE MEASUREMENT SUMMARY

Measurement Location	Existing L_{dn}
Long-Term (Continuous 24-Hour) Measurements	
LT-1	67 dBA
LT-2	67 dBA
LT-3	69 dBA
LT-4	73 dBA
Short-Term (10-Minute Spot) Measurements	
ST-1	66 dBA
ST-2	66 dBA
ST-3	61 dBA
ST-4	72 dBA
ST-5	68 dBA

2.8.2 Noise Impacts

2.8.2.1 Thresholds of Significance

For the purposes of this project, a noise impact is considered significant if the project would result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels; or
- For a project located within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels.

CEQA does not define what noise level increase would be considered substantial. The City of Sunnyvale defines a significant noise impact from new development on existing land uses if: 1) the existing noise level on the site is normally acceptable and the proposed project would increase the existing, normally acceptable noise level by more than five (5) dBA, but the noise level is still normally acceptable; 2) the existing noise level on the site is normally acceptable, and the proposed project would increase the noise level by more than three (3) dBA, and the noise level now exceeds the normally acceptable levels; or 3) the existing noise level on the site exceeds normally acceptable levels, and the proposed project increases the noise level by more than three (3) dBA (see Table 22).

TABLE 22:
SIGNIFICANT NOISE IMPACTS FROM NEW DEVELOPMENT ON EXISTING LAND USES

Existing L_{dn}	**Significant Noise Impact (Increase in L_{dn} from New Development)**
Normally Acceptable	More than five (5) dBA, but noise level still in the normally acceptable category
Normally Acceptable	More than three (3) dBA and the noise level now exceeds the normally acceptable category
Exceeds Normally Acceptable	More than three (3) dBA

2.8.2.2 Impacts from the General Plan Amendment

The future noise environment at the project site would continue to result primarily from transportation noise sources in the project vicinity. Traffic along local roadways would be the predominant noise source affecting the site. Based on a review of 2020 traffic volumes along project area roadways, traffic noise levels are anticipated to increase by approximately two to three (2-3) dBA L_{dn} as a result of anticipated development.

Noise Impacts to Future Residential Land Uses

Exterior Noise Levels

The perimeter of the project site would be exposed to traffic noise levels exceeding the City of Sunnyvale's "normally acceptable" noise level standard for residential land use (60 dBA L_{dn}). Noise exposures at portions of the project site adjacent to Lawrence Expressway, Duane Avenue, and North Wolfe Road would be 70 dBA Ldn or greater. Table 23 summarizes the results of noise contour distance calculations, assuming no intervening shielding or excess attenuation with distance from the roadway. Residential land uses proposed in these areas would have exterior noise exposures of greater than the "normally acceptable" noise and land use compatibility standards thereby requiring further project-level analyses to design appropriate mitigation measures to reduce exterior and interior noise levels to acceptable levels.

TABLE 23:
FUTURE (2020) NOISE CONTOURS FOR AREA ROADWAYS

Roadway	Distance from Roadway Center to Noise Contour (feet)		
	70 L_{dn}	65 L_{dn}	60 L_{dn}
Lawrence Expressway	280	610	1320
North Wolfe Road	70	150	320
Duane Avenue	60	130	270
Stewart Avenue	--	60	140

Interior Noise Levels

The proposed GPA would allow the construction of multi-story residential units throughout the site. Exterior noise levels at the facades of the nearest residential units to Lawrence Expressway would be 75 dBA L_{dn}. Exterior noise levels at the perimeter of the project site near North Wolfe Road, Duane Avenue, and Stewart Avenue would range from about 65 68 to 69 71 dBA L_{dn} at a distance of 50 feet from the roadway center. Where exterior noise levels exceed 60 dBA L_{dn}, a report must be submitted with the building plans describing the

noise control measures that have been incorporated into the design of the project to meet the noise limit.

Standard residential construction with the windows partially open for ventilation provides approximately 15 dBA of exterior to interior noise reduction. Standard residential construction assuming the incorporation of a forced-air mechanical ventilation unit (allowing the occupant to control noise by maintaining the windows shut) provides 20 to 25 dBA of noise reduction in interior spaces. Acceptable outdoor noise levels for residential land uses is 60 dBA or less and the acceptable indoor noise level is 45 dBA or less. Outdoor noise levels at the site are predicted to be as high as 73 dBA L_{dn}, Therefore, with typical residential construction, interior noise levels may exceed the City's acceptable interior noise goal of 45 dBA L_{dn}. For this reason, the project would be subject to significant noise impacts.

IMPACT NOISE-1: The proposed project would be exposed to noise levels above the City's exterior noise goal of 60 dB L_{dn} and the interior noise goal of 45 dB L_{dn}. (Significant Impact)

Noise Impacts from the Future Residential Land Uses

Project Generated Traffic Impacts

As mentioned previously, the primary noise source in the project area is vehicular traffic on surrounding roadways and nearby US 101. For traffic noise to increase noticeably (minimum of three dBA increase), existing traffic volumes must double. The proposed ITR designation on the site would generate approximately 5,150 net additional daily traffic trips (refer to Section *2.6 Transportation* and Appendix F of this EIR). Project generated traffic noise would not be noticeable over the existing traffic generated noise from nearby roadways. For this reason, the project-generated traffic would not result in significant noise impacts.

IMPACT NOISE-2: While the proposed GPA would incrementally increase traffic volumes on the overall roadway network and in the site vicinity, the additional traffic generated by the change in land use would not be noticeable over existing traffic noise from nearby roadways. (Less Than Significant Impact)

Short-Term Construction Related Noise Impacts

Construction of the project would result in elevated short-term construction related noise at the existing adjacent land uses. Noise impacts resulting from construction depend on the noise generated by various pieces of construction equipment, the timing and duration of noise generating activities, and the distance between construction noise sources and noise sensitive receptors. Construction noise impacts primarily occur when: construction activities occur during noise-sensitive times of the day (early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise sensitive land uses, or when construction durations last over extended periods of time.

Construction-related noise levels are normally highest during the demolition phase and during the construction of project infrastructure. These phases of construction require heavy equipment that normally generates the highest noise levels over extended periods of time. Typical hourly average construction generated noise levels are about 81 dBA to 88 dBA measured at a distance of 50 feet from the center of the site during busy construction periods

(e.g., earth moving equipment, impact tools, etc.). Construction-related noise levels are normally less during building erection, finishing, and landscaping phases. There would be variations in construction noise levels on a day-to-day basis depending on the actual activities occurring at the site. Construction generated noise levels drop off at a rate of about six (6) dBA per doubling of distance between the source and receptor. Shielding by buildings would provide an additional five (5) to 10 decibels of attenuation at distant receptors.

If pile driving is necessary, pile driving noise levels would vary with the distance between the pile driving and sensitive receptors, and would depend on the soils on-site. Conventional diesel-powered pile drivers, without noise mitigation, generate maximum instantaneous noise levels of 105 dBA at a distance of 50 feet from the driver. This noise level is achieved every time the hammer strikes a pile. The noise generally decreases at a rate of approximately six (6) dBA per every doubling of distance. The noise levels at the adjacent sensitive receptors, therefore, would vary and would be dependent on the distance from the driver.

Due to the proximity of sensitive receptors, including the residences to the north of the site (approximately 50 feet from the site), construction work would result in a significant temporary noise impact.

IMPACT NOISE-3: The proposed redevelopment of the site would result in significant short-term increases in noise levels in the project area, especially during grading, below grade work, and pile driving. (Significant Impact)

2.8.2.3 Impacts from the Specific Development Projects

Noise Impacts to the Development Projects

Existing Noise Levels

The project proposes residential land uses in a noise environment exceeding 60 dBA L_{dn}, which exceeds the noise and land use compatibility standards presented in the City of Sunnyvale's General Plan. Interior noise levels would be expected to exceed 45 dBA without the incorporation of noise insulation features in the project design.

AMD Property Development Project Site

The AMD project proposes the construction of a 250-unit townhouse development adjacent to Duane Avenue. The site would be bordered by residential land uses to the north, and offices and parking lots to the east, south, and west. The noise sources at this project site are primarily local vehicular traffic along Duane Avenue and distant traffic noise generated by Lawrence Expressway and Highway 101. Exterior use areas proposed by this project include private porches and a small playground. Porches of residential units adjacent to Duane Avenue are oriented toward the roadway (refer to Figure 6).

Future traffic noise levels at the nearest residential units to Duane Avenue, approximately 50 feet from the center of the roadway, would reach 71 dBA L_{dn}. Exterior noise levels at the facades of second-row residential units would be approximately 62 to 67 dBA L_{dn} assuming partial shielding provided by first row units. Exterior noise levels would be 60 dBA L_{dn} or less throughout the remainder of the site.

Taylor Woodrow Development Project Site

The Taylor Woodrow project proposes the construction of 304 multi-family residential units. Units would be developed in a mix of condominiums/flats and townhouses. The site is bordered by Duane Court and single-family residential land uses to the north, Lawrence Expressway to the east, a service station to the south, and East Julian Avenue and industrial uses to the west. The future noise environment at the project site would result primarily from local vehicular traffic along Lawrence Expressway. Exterior use areas proposed by the project include common courtyards within the five-story condominiums/flat buildings at the southeast corner of the project site and small decks and patios at the proposed five-plex townhouse buildings.

Future noise levels at the project site would range from about 60 dBA L_{dn} at the westernmost portion of the project site (assuming partial shielding by proposed residential buildings) to 75 dBA L_{dn} at unshielded residential facades adjacent to Lawrence Expressway. Noise levels in common courtyards within the five-story condominiums/flat buildings would be 60 dBA L_{dn} or less assuming the shielding provided by the buildings themselves.

Standard residential construction with the windows partially open for ventilation provides approximately 15 dBA of exterior to interior noise reduction. Standard residential construction assuming the incorporation of a forced-air mechanical ventilation unit (allowing the occupant to control noise by maintaining the windows shut) provides 20 to 25 dBA of noise reduction in interior spaces. When the required noise reduction of the partition (wall, windows, doors) is greater than 20 to 25 dBA (e.g., in noise environments greater than 65 dBA L_{dn}) sound-rated construction is normally required. Exterior noise exposures at residential facades adjacent to Duane Avenue and Lawrence Expressway would require sound-rated construction methods to adequately reduce noise levels in interior spaces.

IMPACT NOISE-4: The proposed residential units at the northern end of the AMD development site along Duane Avenue, and on the Taylor Woodrow development site along Lawrence Expressway, would be exposed to noise levels above the City's exterior noise goal of 60 dB L_{dn} and the interior noise goal of 45 dB L_{dn}. (Significant Impact)

Noise Impacts from Specific Residential Development Projects

Project-Generated Traffic Noise

As stated previously in the discussion of program level traffic noise impacts resulting from the proposed GPA, the traffic generated by development of the AMD and Taylor Woodrow properties with residential land uses would not result in increases in day-night average noise levels at noise-sensitive receivers in the project vicinity. The specific development projects' contribution to the future noise environment off-site would not be measurable or perceptible, and therefore, would not be significant.

IMPACT NOISE-5: While the proposed residential projects would incrementally increase traffic volumes on the overall roadway network and in the site vicinity, the additional traffic generated by these developments would not be noticeable over existing traffic noise from nearby roadways. (Less Than Significant Impact)

Construction Noise

As described above under Impacts from the General Plan Amendment, construction of each specific development project would result in elevated short-term construction related noise levels at the existing adjacent land uses. Construction-related noise levels are normally highest during the demolition phase and during the construction of project infrastructure. If pile driving is necessary, pile driving noise levels would also impact adjacent sensitive uses. Given the proximity of sensitive uses to these development sites (i.e., the residences north of both sites, across Duane Avenue), and the unknown timing and duration of construction activities on these sites, this impact is considered significant.

IMPACT NOISE-6: The proposed specific development projects would result in significant short-term increases in noise levels in the project area, especially during grading, below grade work, and pile driving. (Significant Impact)

2.8.3 General Plan Policies and Actions

The policies and actions of the City of Sunnyvale General Plan have been adopted for the purpose of avoiding or mitigating potential environmental effects resulting from planned development within the City. The City of Sunnyvale General Plan *Noise Sub-Element* of the *Environmental Management Element* (adopted 1997) contains policies and action statements related to noise. Conformance with the following General Plan policies and actions from the *Community Design and Noise Sub-Elements* will reduce or avoid noise impacts:

Community Design Action Statement 2.5C.2f states to review project design to ensure minimum noise impacts to adjoining properties and reduce noise impacts from off-site sources, such as traffic.

Noise Policy 3.6A.1 states that the City should prevent significant noise impacts from new development by applying State noise guidelines and Sunnyvale Municipal Code noise regulations in the evaluation of land use issues and proposals.

Noise Action Statement 3.6A.1b states that the City should comply with State guidelines for the compatibility of land uses with their noise environments, except where the City determines that there are prevailing circumstances of a unique or special nature.

Noise Policy 3.6A.2 states that the City should enforce and supplement State laws regarding interior noise levels of residential units.

Noise Action Statement 3.6A.2a states that the City should enforce Title 24 noise insulation requirements for all new hotels, motels, apartments, condominiums and other dwellings, including single-family detached units.

Noise Action Statement 3.6A.2b states that the City should attempt to achieve a maximum instantaneous noise level of 50 dBA in bedrooms and 55 dBA in other areas of residential units exposed to train or aircraft noise, where the exterior L_{dn} exceeds 55 dB.

Noise Action Statement 3.6A.3a states to use a combination of barriers, setbacks, site planning and building design techniques to reduce noise impacts, keeping in mind their benefits and shortcomings.

2.8.4 Mitigation and Avoidance Measures

2.8.4.1 Program Mitigation Measures

State Law

All new multi-family residential development will be subject to existing laws, including the following:

- Title 24: Multi-family housing proposed on any site is subject to the requirements of Title 24, Part 2, of the State Building Code. Since noise levels exceed 60 dB L_{dn} on the site, an analysis detailing the treatments incorporated into the building plans shall be prepared and submitted to the City Community Development Department prior to issuance of a building permit. The report shall demonstrate that the design would achieve an interior L_{dn} of 45 dBA or less in all habitable residential areas. Typically, where the exterior noise levels are between 60-70 dBA L_{dn}, treatments include forced-air mechanical ventilation or air conditioning as necessary to achieve a habitable interior environment with the windows closed. In areas where exterior noise levels exceed 70 dBA L_{dn}, insulation features such as stucco-sided walls and sound-rated windows and doors are required.

2.8.4.2 General Plan Amendment

Impacts to Future Residential Uses from Existing Noise Levels

The following mitigation measures shall be included in the project to reduce impacts from high noise levels upon future residential areas to a less-than-significant level:

MITIGATION MEASURE NOISE-1: When developing each future project's site plan, locate noise-sensitive outdoor use areas away from adjacent noise sources. Shield noise-sensitive spaces with buildings or noise barriers whenever possible to reduce exterior noise levels. The final detailed design of the heights and limits of proposed noise barriers shall be completed at the time that the final site and grading plans are submitted.

MITIGATION MEASURE NOISE-2: Project-specific acoustical analyses are mandated by the State for new multi-family uses where noise levels exceed 60 dBA L_{dn}. Each future development project on the site shall complete a detailed analysis during the design-level of the project to select appropriate windows and wall assemblies to meet interior noise standards. The analyses shall meet the following noise reduction requirements.

- Interior average noise levels shall be reduced to 45 dBA L_{dn} or lower to meet State and local standards.

- Building sound insulation requirements shall include the provision of forced-air mechanical ventilation for all new units exposed to exterior noise levels greater than 60 dBA L_{dn}, so that windows could be kept closed at the occupant's discretion to control noise.

- Special building construction techniques (e.g., sound-rated windows and building facade treatments) would be required for new residential uses adjacent to perimeter roadways. These treatments include, but are not limited to, sound rated windows and doors, sound rated wall constructions, acoustical caulking, etc. The specific determination of what treatments are necessary will be conducted on a unit-by-unit basis.

- Buildings with the greatest exposure to noise from Duane Avenue and Lawrence Expressway may require windows with sound insulation ratings ranging from approximately STC 28 to STC 33, depending on the size and shape of windows and rooms. These ratings can be achieved using well sealed dual pane windows with various glazing configurations.

- Results of the analysis, including the description of the necessary noise control treatments, will be submitted to the City along with the building plans and approved prior to issuance of a building permit.

Construction-Related Noise Impacts

The following mitigation measures shall be included in all redevelopment projects on the site under the proposed ITR designation to reduce short-term construction related noise impacts to a less than significant level:

MITIGATION MEASURE NOISE-3: Post signs at the construction sites that include permitted construction days and hours, a day and evening contact number for the job site and day and evening contact number for the City in the event of problems.

MITIGATION MEASURE NOISE-4: The contractor shall prepare a detailed construction plan identifying the schedule for major noise-generating construction activities. The construction plan shall identify a procedure for coordination with adjacent residential land uses so that construction activities can be scheduled to minimize noise disturbance. Notify neighbors of the schedule and type of equipment that would be used for each phase of construction.

MITIGATION MEASURE NOISE-5: Limit construction hours to between 7:00 AM and 6:00 PM on weekdays, and between 8:00 AM and 5:00 PM on Saturdays.

MITIGATION MEASURE NOISE-6: Utilize "quiet" air compressors and other stationary noise sources where technology exists. Locate noisy stationary equipment (e.g., generators and compressors) away from the most sensitive adjacent uses.

MITIGATION MEASURE NOISE-7: Require that all construction equipment be in good working order and that mufflers are inspected for proper functioning.

MITIGATION MEASURE NOISE-8: Designate a construction noise coordinator. This coordinator shall be available to respond to complaints from neighbors and take appropriate measures to reduce noise.

MITIGATION MEASURE NOISE-9: If pile driving is required, implement site-specific noise and vibration attenuation measures under the supervision of a qualified acoustical consultant such as the following measures:

- Multiple pile drivers shall be considered to expedite this phase of project construction. Although noise levels generated by multiple pile drivers would be higher than the noise generated by a single pile driver, the total duration of pile driving activities would be reduced.
- Temporary noise control blanket barriers shall shroud pile drivers. Such noise control blanket barriers can be rented and quickly erected.
- The contractor shall pre-drill pile holes to minimize the number of blows required to seat the pile for all piles driven within 200 feet of sensitive land uses. Pre-drilling foundation pile holes is a standard construction noise control technique. Pre-drilling reduces the number of blows required to seat the pile. The associated noise reduction would be based on the soil conditions of the site.
- The contractor shall prepare a detailed construction plan identifying the schedule for major noise-generating construction activities. The construction plan shall identify a procedure for coordination with the adjacent noise sensitive facilities so that construction activities and the event schedule can be scheduled to minimize noise disturbance.
- Notify land uses located within 200 feet of pile driving activities of the construction schedule in writing.

2.8.4.3 Specific Development Projects

Impacts to Proposed Residential Uses from Existing Noise Levels

The following mitigation measures shall be included in the project to reduce impacts from high ambient noise levels to the future residents on the specific development sites:

MITIGATION MEASURE NOISE-10: Project-specific acoustical analyses are mandated by the State for new multi-family uses where noise levels exceed 60 dBA L_{dn}. Each future development project on the site shall complete a detailed analysis during the design-level of the project to select appropriate windows and wall assemblies to meet interior noise standards. The analyses shall meet the following noise reduction requirements.

- Interior average noise levels shall be reduced to 45 dBA L_{dn} or lower to meet State and local standards.

- Building sound insulation requirements shall include the provision of forced-air mechanical ventilation for all new units exposed to exterior noise levels greater than 60 dBA L_{dn}, so that windows could be kept closed at the occupant's discretion to control noise.

- Special building construction techniques (e.g., sound-rated windows and building facade treatments) would be required for new residential uses adjacent to perimeter roadways. These treatments include, but are not limited to, sound rated windows and

doors, sound rated wall constructions, acoustical caulking, etc. The specific determination of what treatments are necessary will be conducted on a unit-by-unit basis.

- Buildings with the greatest exposure to noise from Duane Avenue and Lawrence Expressway may require windows with sound insulation ratings of approximately STC 30 or greater, depending on the size and shape of windows and rooms. These ratings can be achieved using well sealed dual pane windows with various glazing configurations.

- Results of the analysis, including the description of the necessary noise control treatments, will be submitted to the City along with the building plans and approved prior to issuance of a building permit.

Construction-Related Noise Impacts

MITIGATION MEASURE NOISE-11: Each specific development project shall be required to implement the mitigation measures described above under General Plan Amendment Mitigation (Mitigation Measures Noise 3-9). With implementation of these measures on each specific site, short-term noise impacts would be reduced to a less than significant level.

2.8.5 Conclusion

NOISE-1: Implementation of the above mitigation measures will reduce exterior and interior noise level exposure to within State and local standards. **(Less Than Significant Impact with Mitigation Incorporated)**

NOISE-2: While the proposed GPA would incrementally increase traffic volumes on the overall roadway network and in the site vicinity, the additional traffic generated by the change in land use would not be noticeable over existing traffic noise from nearby roadways. **(Less Than Significant Impact)**

NOISE-3: Implementation of the above mitigation measures will reduce short-term construction noise impacts. **(Less Than Significant Impact with Mitigation Incorporated)**

NOISE-4: Implementation of the above mitigation measures will reduce exterior and interior noise level exposure at the northern end of the AMD development site along Duane Avenue, and on the Taylor Woodrow development site along Lawrence Expressway to within State and local standards. **(Less Than Significant Impact with Mitigation Incorporated)**

NOISE-5: While the proposed residential projects would incrementally increase traffic volumes on the overall roadway network and in the site vicinity, the additional traffic generated by these developments would not be noticeable over existing traffic noise from nearby roadways. **(Less Than Significant Impact)**

NOISE-6: Implementation of the above mitigation measures will reduce short-term construction noise impacts resulting from the specific development projects. **(Less Than Significant Impact with Mitigation Incorporated)**